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SCIENTIFIC ENTITIES I*

By J. B. Thornton

Dr. G. B. Brown in a recent book tells of a "letter which he wrote to a leading scientific weekly on the occasion of the celebration of the fiftieth anniversary of the discovery of the electron".[1] In the letter, it seems, he suggested that Sir J. J. Thompson hadn't *discovered* the electron at all, but had *invented* it; and suggested that

> ". . . for twenty years we have known that (the electron) behaves in some circumstances more like a wave disturbance than a particle, so the hypothesis is not altogether a satisfactory one, and might have to be dropped. In view of the fact that foreign visitors had been invited, and a banquet announced, he ventured (in the letter) to suggest that Lloyds should be approached to see if they would quote a premium for insuring the hypothesis against its becoming untenable before the date of the jubilations"

Dr. Brown mentions that the letter was not published, and comments that

> ". . . the banquet passed off without any of the guests realizing that they were the victims of a metaphysical hoax . . . they thought they had celebrated a scientific discovery like that of Neptune, or penicillin"

No doubt this is good clean scientific fun; but the joke loses much of its point when we notice that there is nothing in the least iconoclastic in the view that the electron is a scientific fiction, nor in the view that the fictional electron has a different ontological status from those possessed by Neptune

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* Based on a paper read at Canberra to the 1952 Annual Congress of the Association. Part II, based on the same paper, will appear in the next issue.

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and penicillin—such views, indeed, are nowadays the strictest scientific orthodoxy. Lindsay and Margenau, for instance, in 1936 took for granted that "no physical theory merely portrays facts";[2] that any such theory "also involves postulates and ideas which are not directly derived from experience": they warned their reader that he must not

> "look upon such things as the electron, or the more recently-discovered positron, as entities of the same empirical status as the tree he sees. . . . The electron should be regarded as a construct rather than a fact, for it is not an immediate datum of our experience, but the result of an elaborate sequence of inferences which, incidentally, is not unique".

There is, then, no challenge to scientific orthodoxy in the contention that the electron was invented in 1897. Dr. Brown might have come closer to such a challenge if (to take one of his own examples) he had written his letter a year earlier, in 1946, when the centenary of the discovery of Neptune was being similarly celebrated. There may, perhaps, have been some scientific eyebrows raised if he had seized that occasion to argue that the planet Neptune was invented in 1846.

Yet even that contention would not have been entirely unheard of: many writers have, following Ernst Mach, taken up positions in which it would be maintained that a planet is no more to be regarded as "an immediate datum of our experience" than is an electron; that a planet like an electron is "the result of an elaborate sequence of inferences which are not unique"; that a planet therefore is, equally with an electron, an invention. Dr. Harold Jeffreys in 1935 discussed the question whether Neptune existed before it was observed, and pointed out (very properly) that telescopic observation was not in any *special* sense a discovery of the planet—

> "The perturbations of Uranus afforded just the same kind of ground epistemologically for inferring the existence of Neptune that a telescopic observation does".[3]

Many physicists would take this to mean that however we may be led to postulate the existence of Neptune, whether by calculations on the observed perturbations of Uranus or by calculations on the positions of some points of light observed through a telescope in the Berlin Observatory on the evening of 23rd September, 1846, and subsequently—in either case, it would be said, a certain entity is inferred to exist in order that certain observations may be accounted for or "correlated", and is inferred to be of just such kinds, and just so circumstanced, as will enable it to account for the observations. This, I say, would be a quite commonly accepted interpretation of Jeffrey's contention; and it may be that the editor who didn't publish Dr. Brown's letter took his point to be the most trifling commonplace.

The contention that the electron—and perhaps Neptune—has been invented and not discovered, we shall return to. Just now it serves to illustrate the fact that there are some debates among scientists about the general characters of scientific propositions and their terms. It is, for instance, argued that there are some specially scientific entities, and that these are in some sense the most fundamental things in the world (as, indeed, and despite Dr. Brown, electrons are sometimes held to be); on the other hand it is sometimes held that the scientific entities are mere fictions of the mind, or are in some other way less real than some other things. Just so, it is sometimes held that there are some specially scientific propositions, and that these are the truest and most compelling of propositions; and sometimes argued that the specially scientific propositions are mere shorthand summaries of real events, and are neither true nor false but are, at most, more or less convenient, or are in some other way logically different from some other propositions.

Most philosophers would, I think, hold that such contentions as these raise philosophical questions, and they would suppose that the questions so raised are to be settled on philosophical grounds. They would suppose that anyone who talks of some things as more fundamental than others, or who declares some things to be mental fictions, or who holds that some propositions are in themselves more compellingly true than others, must be prepared to defend those contentions on philosophical grounds. It is therefore worth noticing that many scientists now hold that science has its own philosophy—a philosophy which owes no allegiance to, and can be developed independently of, traditional philosophy. For instance, the Editorial Board of the recently-launched *British Journal for the Philosophy of Science* lay it down, in a foreword to the first number of that journal, that

> "We shall not publish articles which . . . seek to mould science to the demands of an independently-conceived philosophy. . . . In general, science, both past and present, will be taken as the primary datum for consideration, and the consideration will be that of the philosophical implications contained in it".[4]

It is, clearly, assumed here that the scientist need not take seriously any criticisms of scientific theories which rest upon general philosophic views; and this in turn amounts to the assumption that there is a special scientific way of being different from being in general, and a special scientific truth different from truth in general. The willingness—one might almost call it the anxiety—of the philosophers of science to disregard the discussions of traditional philosophy, and even to suppose that philosophical questions are *settled* by scientific theories (as the phrase "philosophical implications" suggests), is illustrated in the opening paragraph of the first paper in that same journal, when Professor Herbert Dingle says:

> "It is now generally agreed that the theory of relativity has made necessary a new conception of the nature of physical science. . . . Formerly science was regarded as the study of an external world, independent of the observer whose experiments and observations were simply means of finding out how the world was constructed and by what laws its behaviour was governed. The emphasis has now shifted from the nature of the world to the operations of experiment and observation. These are no longer regarded as more or less arbitrary means of discovering the already established order of nature, but rather as affording primary data for rational study; and any world we may contemplate is no longer an independent existence whose nature demands or determines them, but (is) rather a logical construct . . . ."

Professor Dingle expects us to take the "theory of relativity" *in toto* as what the Editorial Committee called a "primary datum"—as something unchallengeable by "independently-conceived" philosophies—and to take for granted that this theory *settles* philosophical questions, and requires us to hold for instance that "any world we may contemplate is no longer an independent existence . . . but (is) rather a logical construct". I think that such views as these must be taken seriously now, when science is claiming to be a philosophy; when "the philosophy of science" is being strongly supported as an independent academic study in its own right; when, indeed, we may any day now find (say) Bridgman's *Reflections of a Physicist* proposed as a better introduction to philosophy than the Socratic dialogues or Descartes's *Meditations.* I suggest, therefore, that in our discussion of scientific entities we should have in mind the claim that there is a special philosophy of science: the claim, as I would put it, that there is a special scientific way of being and a special scientific brand of truth.

In 1923, when philosophers could still suppose that they might have something significant to say on such a topic, Sir Percy Nunn spoke to the Aristotelian Society about "Scientific Objects and Common-sense Things". Nunn, in his address, suggests that science

> ". . . sets out with a two-fold object: first to make an inventory . . . of the observable things and events that constitute the tissue of nature; secondly (and chiefly) to make the emergence of those things and events intelligible";[5]

and he goes on to point out, particularly with regard to the physical sciences, that

> "Their greatest achievement is generally held to be the discovery, behind the veil of common-sense things and observable events, of a world of 'scientific objects' and unobservable events—heat, electricity, ether, atoms, electrons, etc., and their movements and interactions";

and suggests that

> "These entities have always come into the scientific argument as hypotheses by means of which the behaviour of the common-sense world could be made more intelligible."

He mentions

> ". . . the widely-held belief that the invisible physical world has a higher reality than the visible, and is in some way responsible for the very existence of the visible world",

and declares that, for him, this

> ". . . bifurcation of nature, and the associated doubt about the reality of the common-sense world, were entirely unacceptable."

Nunn, holding that

> "The central question is whether objects can exist which possess the primary qualities of common-sense things but have none of their secondary qualities",

and that

> ". . . experience gives no warrant for such a supposition",

concludes that

> "Common-sense things are primary syntheses or constructions of sense-data; scientific objects are secondary syntheses or constructions of the same data",

so that

> ". . . the pretension that the scientific objects are the reality of which the common-sense world is but the appearance must be entirely abandoned".

And so Nunn rejects one "bifurcation of nature" to put another in its place. In place of a distinction between the fundamental scientific entities and the common-sense appearances, we are offered a distinction between the common-sense primary syntheses and the scientific secondary syntheses: we are still left with a variety of logical kinds. The distinction between primary and secondary syntheses of sense-data is not discussed in this paper, but elsewhere[6] Nunn maintains that the primary syntheses of sense-data are "inevitable" and are "such as mankind everywhere would make from the same sensational data", while the secondary syntheses are "embroideries"—are not inevitable, and are merely "hypotheses by means of which the behaviour of the common-sense world can be made intelligible".

I take it that the admission of *inevitable* syntheses of sense-data is tantamount to an abandoning of the sense-datum theory. Nunn indeed frequently speaks of sensa and some of their "forms of association" as being equally parts of what he calls "the Objective", as equally "announcing their priority to perception"; and it appears that objective forms of association, like inevitable syntheses, are his attempt to bring together what he and others have put asunder as separate sense-data. An *inevitable* synthesis can only be regarded as an independent state of affairs; and in this case the distinction between primary and secondary syntheses comes to be a distinction between the syntheses made because they *are there,* and the syntheses made because, although they *are not there,* yet they serve to *make intelligible* what is there. And, putting it this way, it is clear that the central question is not

> ". . . whether objects can exist which possess the primary qualities of common-sense things but have none of their secondary qualities",

but is whether it makes sense to talk about things which, though they do not exist, yet serve to make existences intelligible; and whether, indeed, it is proper to talk at all about making things intelligible.

Nunn maintains that the "data of experience" are made intelligible by being brought into "apperceptive systems"; he holds that the accepted body of scientific doctrine constitutes such a system and may be contrasted with other apperceptive systems—for instance, with animistic and religious apperceptive systems—which also serve, after their own fashions, to render intelligible the data of experience. Now suppose one asks just *how* bringing things into systems differs from what Nunn called making an inventory of things and events. There are, I think, two answers commonly given. It is sometimes held that relations between things are not part of "the tissue of nature" and that systems are "constructions", not things come upon. But sometimes it is held that while there are, in the tissue of nature, relations between things, these, as we come upon them, are *accidental*; and that they are to be made intelligible by being shown to be, despite appearances, *necessary*. The first of these two answers is, roughly, Nunn's, and is a view now widely adopted; the second, I shall contend, has played the greater part in the growth of science, and with it I shall be chiefly concerned in this paper. But we should note that most scientists accept one or other of these views, and that in either case it is being held that science has to do more than make an inventory of what happens—it has also to *explain* what happens in terms of some things which do *not* just happen—which are not part of "the tissue of nature".

I shall therefore accept the view that science has the two objects Nunn mentions; but instead of regarding these two aims as complementary, I shall regard them as *opposed* to one another; and shall suggest that throughout the growth of science there is a constant *conflict* between the desire to know what happens and the desire to explain what happens. And since sometimes explanation is taken (and, I think, properly taken) to be simply a matter of pointing out contingent relations between events, I must make it clear that, in my view, explanation appears most commonly, both in science and in everyday discussion, as an attempt to show that certain relations, apparently contingent, are in truth necessary. People commonly seek, in an explanation of an event, not an account of the *circumstances* of that event, but an account of the very reason why that event had to happen and couldn't possibly have failed to happen, and of the very reason why that event just had to happen as and when it did and couldn't possibly have happened otherwise. And of course, people seeking guarantees for events expect further that the guarantors will not themselves need guarantees, or at least will not need to be guaranteed in the same way, or with the same urgency, as the things they explain—they expect the guarantors to have a special logical status. Assuming, then, that *this* is the way in which explanation has generally been taken in scientific thinking (and hoping to justify that assumption in what follows), I shall argue that there is, in science, a constant conflict between an interest in *things* and an interest in *special entities*—specially scientific entities, whose function is to provide guarantees and to make things "intelligible".

Let me illustrate. One of my students was reading a little paper on the chemical theory of ionic dissociation. "Suppose", he said, "you show me a test-tube containing a solution of barium chloride, and another containing dilute sulphuric acid, and then you mix these solutions. There is a copious white precipitate. You tell me that barium sulphate has been formed, and that a precipitate appears because barium sulphate is insoluble in water. Now I can see that a precipitate *is* formed, but I don't see why barium sulphate *has to be* formed. I can see this happen a dozen times, but I still want to know *why*. Even if you show me, with other examples, that any soluble barium salt reacts with any soluble sulphate to form barium sulphate, I still want to know why—I still don't see why it must. But if you explain to me that the barium is present, to begin with, as positively-charged barium ions, and that the sulphate is present as negatively-charged ions, then I can see straight away that they *must* combine when they get the chance, because the unlike charges attract one another. In this way", he concluded, "the ionic theory explains such reactions and at last enables us to understand them".[7]

My student, you see, wanted necessities, not facts. Now it might be objected that the interpretation I am putting on the student's argument is not a proper one; that the attractions between oppositely-charged particles are facts like any others. But this clearly (though it may be true) is not what the student intended. He mentioned, but rejected as an explanation, the fact that any soluble barium salt reacts with any soluble sulphate to form insoluble barium sulphate; and he rejected this just because it still left him asking *why*. And he *accepted* the explanation in terms of the attractions of oppositely-charged particles just because this didn't leave him asking why. For him, the opposite charges were "scientific entities"; the attractions they caused just had to happen; they provided a *final* explanation. And please note that I am not saying that the attractions of oppositely-charged particles *can't* be treated as facts: I am merely saying that here, as often, they were treated as necessities and as on a different *logical* footing from facts.

Again, everyone who has taught electricity has been asked that perennial question, "What is electricity?" Those who, having been asked this question, have answered it with a presentation of some of the events we distinguish as electrical, know that such an answer never suffices. When the descriptions are complete and the demonstrations all concluded, when a wealth of *happenings* have been laid before the questioner, they will still be confronted with "Yes, that's all very well. But you still haven't shown me what electricity *really* is. You've shown me what it can do, but not what it is, in itself and apart from everything else. You haven't shown me *why* all these things have to happen."

Now here again it might be argued that it is very proper for students to refuse to be *satisfied* with any answer to their question, to refuse to take any answer as a final answer; and quite proper for them always to demand more facts than have been presented to them. So it is—but the point here is that students reject the descriptive answers given to that question just because such answers are not final. The presentation of *events* doesn't meet this sort of question just because one can always ask, about any event, "Why is it so?". The questioners here seek a final answer, something of which we cannot and do not need to ask, "Why is it so?". They seek not events but essences: entities whose whole nature it is (or would be, if there were such) to bring about the events being explained: entities which would, if only they could be produced, remove all wonder, end all puzzlement, and allay all doubt.[8] Teachers—especially, perhaps, the less scrupulous ones—know that this question *can* be answered so as to quiet students' enquiries if they are told, for instance, that electricity is an intangible, invisible, imponderable something, never known directly, and known only indirectly through those observable effects which it is by nature fitted to bring about. That sort of mystification *does* answer the question.

In much the same way students generally are dissatisfied with the theory of magnetic domains—a theory which supposes that there are, in magnetisable materials, large numbers of minute magnets. It supposes that these minute magnets are, when the material as a whole is unmagnetised, chaotically arranged; and that, when the material is brought into an external magnetic field, the minute magnets are able to rotate and to align themselves in the direction of the external field, so that the material as a whole then behaves as a single magnet. The theory relates these suppositions very neatly to a number of the well-known properties of magnetic materials. Now the complaint commonly made is that this theory is unsatisfactory because "it explains magnets in terms of magnets", and because it does not help us to understand what magnets *really* are, nor why they should behave as they do. And once more, it may be perfectly proper to seek a further theory of the minute magnets; but the commonly-made objection arises from the assumption that facts are not explained by facts of the same order, and that *being understandable* is different from *merely being*; from the assumption that "magnetism" will be explained by something which is not, as we may put it, a magnetic event, but which is rather something over and above magnetic events — something whose nature it is to bring about magnetic events, and which can thus guarantee the magnetic behaviour of magnets. The demand is for something which would tell us, or seem to tell us, once and for all, *all about* magnets; and this demand, like that in the preceding example, can best be met (if one wishes to meet it) by obscure pronouncements about, say, the inevitable and observable "effects" of unobservable spinning electrons.

These, you may say, are students' misunderstandings. So they are; but they illustrate a conception of *theory* and of *explanation* often found in the work of scientists. When Sir Robert Ball, for instance, is commending Kepler's discovery of the three well-known laws of planetary motion, and wishes to make the point that Kepler's work is the more meritorious in that it preceded, and was made without the help of, Newton's wider generalisation, he puts it this way:

> "The more we ponder on this memorable achievement the more striking will it appear. It must be remembered that in these days we know of the physical necessity which requires that a planet shall revolve in an ellipse and not in any other curve. But Kepler had no such knowledge. Even to the last hour of his life he remained in ignorance of any natural cause which ordained that planets should follow those particular curves . . . . Kepler's assignment of the ellipse as the true form of the planetary orbit is to be regarded as a brilliant guess . . . ."[9]

Here, it is suggested, the law of universal gravitation differs from the laws of planetary motion not merely in being more general—not merely in that the class of its *subjects* includes the class of the subjects of Kepler's laws. It does more than imply the latter; it provides a "physical necessity"—it is "a natural cause which ordains". On this view the law of universal gravitation is more than a report of some events; it is rather a testimony of the existence of a guarantee, gravity, whose job it is to ordain and necessitate the motions that happen. The laws of planetary motion, on the other hand, are in themselves mere accidents;[10] mere states of affairs which may well (in the absence of the guarantee) have been different. They are, in themselves, something merely guessed at, and are not known with that certainty with which (it is suggested) the law of universal gravitation and its consequences may be known. To have arrived at them, as Kepler did, by themselves and apart from their ordainer is, Ball holds, a rather striking achievement.

It is important, of course, to notice (as Ball does not notice) that Kepler *did* make strenuous efforts to show that his laws *were* ordained and guaranteed by something more than other such laws. He held that his laws were ordained by the underlying mathematical harmonies of the universe. He argued—and argued sincerely—that here *had to be* six planets because there *certainly are* five and only five regular solids; that the ratios of the diameters of the orbits of the planets had to be as they are because only so (he held) can those diameters provide a series of spheres in which and about which the regular solids can, one after another, be alternately inscribed and escribed. He held too that the sun is the seat of a moving spirit whose function it is to keep the planets in their appointed stations—that the sun, by its rotation, ordains the revolutions of the planets. Kepler himself set much greater store on his discovery of the relations between the ratios of the planetary orbits and the possibility of alternately inscribed and escribed regular solids, than he set on any others of his discoveries; and for him none of these was to be regarded as "a brilliant guess". They were rather the necessary outcomes of the pre-ordained harmonies of the world: harmonies neither guessed at nor come upon, but known by faith.

So Kepler and Ball alike, and despite the three hundred years between them, illustrate that frame of mind which looks to theory for *final* explanations: the frame of mind which not only invokes such special entities as phlogiston, caloric, frigoric, electric and magnetic effluvia, light corpuscles, and the luminiferous and electromagnetic ethers, but also uses these entities in an attempt to show that events which appear merely to happen (and which, considered in themselves, might happen otherwise) are in truth ordained and could not happen otherwise. That such entities are mere devices for hiding the begging of questions has often been pointed out; but it has, I think, been less often pointed out that they are used to make a show of demonstrating the inner necessity of events which are superficially contingent. The critics of science are generally content to point out that these entities can be done without, that they are an unnecessary encumbrance to scientific thought; and Occam's dictum is taken merely as a postulate of parsimony in the recognition of entities. I shall suggest that criticism can go further and can show not merely that these scientific entities can be done without, but that the use of them arises out of an unscientific notion of explanation, and suggests the presence in scientific thought of motives which are opposed to an interest in events themselves.

Perhaps the most important illustration of the search for necessities is to be found in the widely-held assumption that only *mechanical* explanations are truly convincing and intelligible—an assumption stated clearly, for instance, by Helmholtz in his famous 1847 paper on the conservation of energy. Helmholtz first lays it down that

> "The final aim of theoretic natural sciences is to discover the ultimate and unchangeable causes of natural phenomena",[11]

then, more specifically, that

> ". . . the phenomena of nature are to be referred back to the motions of material particles possessing unchangeable moving forces, which are dependent on conditions of space alone";

and so to

> "Finally, therefore, we discover the problem of physical natural science to be, to refer natural phenomena back to unchangeable attractive and repulsive forces, whose intensity depends solely on distance",

with the comment

> "The solvability of this problem is the condition of the complete comprehensibility of nature";

and the final prophecy

> ". . . (the) vocation of theoretical natural science will be ended as soon as the reduction of natural phenomena to simple forces is complete, and the proof given that this is the only reduction of which the phenomena are capable".

Most historians of science, commenting on this paper, direct attention to Helmholtz's assumption that all forces are, finally, *central* forces depending only on distance; and they point out that this assumption had already, before Helmholtz wrote, been rendered precarious by the discovery of electro-magnetic forces which act transversely and depend, in some sense, on velocities as well as on separations. I suggest that what most deserves consideration, in an account of the growth of scientific thought, is the assumption that there *is* a theory which is both necessary and sufficient for "the complete comprehensibility of nature"—a theory which will, once and for all, explain everything. While we lack that theory, it is suggested, nature remains incomprehensible (even though it goes on); once we have it, we see then that nature must go on as it does, and it all becomes comprehensible.

Now these views are no mere adventitious ornament to Helmholtz's paper. He regarded this paper as one of crucial importance (and, despite its initial rejection by the journals, it has come to be so regarded); and he is stating, more carefully and more precisely than they are usually stated, two assumptions which have constantly stood behind physical science, at least since the time of Galileo. These assumptions are, that things, as they happen, are incomprehensible; and that things may be made comprehensible by (and only by) being reduced to simple mechanical entities and their transactions. Galileo himself, for instance, who tells us that he "set out merely to investigate", and who sought to set aside the "phantasies" of the Aristotelians — the doctrines, for instance, of proper places and of natural and violent motions—Galileo, now regarded as the founder of empirical science and the destroyer of a-priorism in science, distinguishes carefully and at length between the primary and secondary qualities of bodies; and he restricts the subject-matter of his science to the primary qualities. He tells us too why he does this: he does it because the primary qualities alone lend themselves to mathematical treatment, and because (as he holds) mathematics, and it alone, gives certain knowledge. It and it alone reveals what truly is. Galileo, like Descartes, has renounced the old authorities and seeks new ones; he looks for new guarantees, and finds them in the mathematical connections of observations of the primary qualities of things. Kepler, at the same time, held a similar doctrine, and for similar reasons—

> "Just as the eye was made to see colours, and the ear to hear sounds, so the human mind was made to understand, not whatever you please, but quantity."[12]

As we have put it, the doctrine is that colours and sounds happen, but are incomprehensible: that they can become understandable, can become the subject of theory, only if somehow they can be reduced to quantities.

Huyghens, a little later, puts the same doctrine thus:

> ". . . in true philosophy the causes of all natural effects are to be conceived mechanically, unless we are to renounce all hope of understanding anything in physics".[13]

The assumptions of the doctrine are, that "understanding" things, and finding them "comprehensible" or "intelligible", consists in *being certain*; and that the propositions of mechanics do carry certainty because they deal with the mathematical relations between the primary qualities of bodies. Those assumptions are put, almost in those words, by du Bois-Reymond, another 150 years later—

> "Natural science . . . is a reduction of the changes in the material world to motions of atoms caused by central forces independent of time. . . . whenever such a reduction is successfully effected, our craving for causality is, for the time being, wholly satisfied. The propositions of mechanics are reducible to mathematical form, and carry with them the same apodictic certainty . . . . When the changes in the material world have been reduced to a constant sum of potential and kinetic energy inherent in a constant mass of matter, there is nothing left in these changes for explanation".[14]

Notice that final phrase—"nothing left in these changes for explanation". Mechanics, you see, is held to give *final* explanations; to *satisfy* "our craving for causality". Here, I suggest, is an often overlooked key to Kelvin's famous remark:

> "I never satisfy myself till I can make a mechanical model of a thing. If I can make a mechanical model I can understand it. As long as I cannot make a mechanical model all the way through, I cannot understand, and that is why I cannot get the electromagnetic theory of light".[15]

It is generally held that this remark shows Kelvin, great man as he was, to have been, after all, an engineer at heart and not a true physicist. I suggest, on the contrary, that the remark brings out very clearly a continuing, although not often acknowledged, tradition in physical science: or, if you like, a canker in the very heart of the subject. The important point about "mechanical models" here is certainly not that they are *models,* and is not merely the point that they are *mechanical.* It is, rather, that being mechanical, they and their transactions are held to carry "the same apodictic certainty" as the constructions and proofs of mathematics are held to carry. Given an explanation in terms of them, it is argued, then nothing further is left for explanation. Kelvin "cannot get the electromagnetic theory of light" just because, for him, it does not "explain" the possibility of "action at a distance"; because it makes "action at a distance" something which "just happens". The mechanical theory of light, on the other hand, does "explain" "action at a distance" by postulating a luminiferous ether whose whole business it is to convey actions from place to place as the mathematical formulae would have them conveyed. It rests its case for intelligibility on an entity which, for Kelvin, becomes the one thing we are really certain of—"One thing we are sure of", he says, "and that is the reality and substantiality of the luminiferous ether".

The fact that such entities as the luminiferous ether are brought into scientific theories in order to provide guarantees is brought out clearly by Sir Oliver Lodge when he asks

> "Is not the direct action of one body on another across empty space, with no means of communication whatever—is this not absolutely unthinkable? . . . wherever one body acts upon another by obvious contact we are satisfied and have a feeling that the phenomenon is simple and intelligible; but whenever one body apparently acts on another at a distance, we are irresistibly impelled to look for the connecting medium".[16]

The "connecting medium" to which we are thus "irresistibly" led is, of course, the ether—the vehicle, for Lodge, not only of the "actions" of light but also of other electromagnetic and gravitational actions, and indeed of all "actions at a distance". The important point is that the ether is, by nature, a *connecting medium*: that its job is to underwrite all actions at a distance and to make them intelligible. Just as Kelvin "cannot get" the electromagnetic theory of light (because he will not concede that Maxwell has fully reduced electromagnetic transactions to the apodictic certainties of mechanical models), so Lodge cannot get *any* actions at a distance. Such actions are only "apparent"; they must be shown, with the help of "a connecting medium", to be, after all, *not* really actions at a distance. Lodge's ether transforms the apparent but unthinkable into the necessary and intelligible; it transmutes complexity into simplicity; it replaces our puzzlement by satisfaction. Notice, incidentally, the suggestion of tautology in his argument—in at least one sense of "direct", it is tautologous to say that "direct action" cannot be "across empty space".

And so while Nunn thinks it important to ask whether we should admit the existence of bodies (such as the ether) possessing only primary qualities, I think it is more important to ask why anyone does ever suppose the existence of bodies possessing only primary qualities. *That* question, Huyghens, Helmholtz, du Bois-Reymond, and Kelvin have answered for us—for them, that supposition is held to be a condition of the complete comprehensibility of nature: it provides explanations which "wholly satisfy" our "craving for causality". Laplace answers it for us, in a famous passage—

> "Given for one instant an intelligence which could comprehend all the forces by which nature is animated and the respective situations of the beings who compose it—an intelligence sufficiently vast to submit these data to analysis—it would embrace in the same formula the movements of the greatest bodies of the universe and those of the lightest atom; for it, nothing would be uncertain and the future, as the past, would be present to its eyes".[17]

"Nothing would be uncertain"—there is our question answered; and answered in much the same way as Sir James

Jeans answers it when he speaks of God as the Supreme Mathematician.

But perhaps you will say that it is not fair to hold too seriously against the scientists the things they say when they mount the pulpit—the pulpit either of Laplace's materialism or of Jeans's mathematicism. That may be, but we can find the same answer to our question throughout even the most pedestrian scientific writings. Witness, for example, one Ira Freeman, in his *Modern Introductory Physics,* on the mechanical theory of heat. Having concluded that

> ". . . the total transitional kinetic energy of the molecules of a gas is proportional to the absolute temperature",[18]

he goes on to observe

> "This gives us, then, a direct mechanical picture of what the elusive concept of temperature really means".

Temperature, you see, even though we meet it every day, is "elusive" and incomprehensible; but a "mechanical picture" of it is "direct" and tells us what it really is—makes it comprehensible. In point of fact, of course, it might be a little nearer the truth to say that the proportionality referred to gives us a direct thermal picture of what the elusive concept of molecular kinetic energy really means: we do, after all, in some sense directly meet and know about temperature in a way that we do not meet or know about molecular kinetic energies. But the physicist will not have it this way—for him the temperatures, the colours, and the sounds that we meet are all "elusive" and are to be replaced by "direct mechanical pictures" carrying apodictic certainty. The "direct" and "real" things are the ones that *have to be* as they are: the primary qualities which, it is held, we can know all about because we can treat them mathematically.

The mechanical theory, then, is evidence for the view that explanation in science is often taken as the demonstration of necessities, and that scientific entities are chiefly invoked in order to provide guarantees. It brings out well, incidentally, what may be regarded as another and rather overlooked aspect of Occam's dictum—that entities are not to be needlessly diminished; that, putting it another way, special entities are not to be built up *at the expense of* ordinary matter-of-fact things—but of this I shall say more later. Meantime, I would not wish it supposed that I am arguing that the scientist, when he seeks necessities, recognises or admits that he is doing that. W. H. Watson is wrong, I think, when in a comment on the passage from Lodge quoted above, he suggests that *any* such entity as Lodge's ether *always*

> . . . is supported not on the grounds of its scientific usefulness as a hypothesis, but on the logical necessity for its existence".[19]

With the substitution, perhaps, of "metaphysical" for "logical", we might allow this to be true for Lodge's argument, as well as for those cited above from Helmholtz, du Bois-Reymond, and the others—although it would be better said that in these arguments we have not just a claim that a special entity exists, but a claim that a special entity adds comprehensibility to the existence and truth of what already happens to exist and be true. But, despite what Watson says, the kind of argument which he has found in Lodge, and which we have found in other writers, is rarely made explicit; and more commonly is deliberately avoided. Helmholtz's paper, as we mentioned, was initially rejected by the leading scientific journals, as was Robert Mayer's paper on the same topic, written at about the same time. In both cases the reason for rejection given by the editors concerned was the complaint that the papers were too metaphysical, too much a priori, for serious scientific consideration. The *consciously*-formulated traditions of science are, clearly enough, *opposed to* a-priorism and the search for necessities; commonly the claim made for the scientific entities is precisely their alleged usefulness as hypotheses. The desire for guarantees is unacknowledged, and (where we suspect it) we generally have to dig for it. On the rare occasions when it comes to the surface it appears rather in prefaces or conclusions than in main arguments; it may appear in a man's informal writings, in his letters, or in his comments on his own and others' works. But that this desire often exists unacknowledged, and that it profoundly affects the shape of scientific thought, we shall see more fully.

(*To be concluded.*)

Notes

[1] G. Burniston Brown: *Science: Its Method and Its Philosophy,* 1950, p. 176.

[2] R. B. Lindsay and H. Margenau: *Foundations of Physics,* 1936, p. 395.

[3] Quoted by H. Dingle: *Through Science to Philosophy,* 1937, p. 93.

[4] *The British Journal for the Philosophy of Science,* Vol. 1, No. 1, 1950, p. 4.

[5] *Proc. Arist. Soc.,* N.S. Vol. XXIV, p. 2.

[6] For instance, T. Percy Nunn: *The Aim and Achievements of Scientific Method,* 1907, p. 47.

[7] A more sophisticated chemist might also invoke, here, the law of mass action; he might or might not similarly regard it as providing a guarantee.

[8] Compare Kelvin's statement: "One word characterises the most strenuous of the efforts I have made during fifty-five years; that word is *failure.* I know no more of electric and magnetic force . . . than I knew . . . fifty years ago." (Quoted by R. A. Gregory: *Discovery,* 1916, p. 20.) Kelvin clearly regards himself as having been seeking the very essence of electric and magnetic force.

[9] Sir Robert S. Ball: *Great Astronomers,* 1906, p. 104.

[10] Compare Gregory, *op. cit.,* p. 168: "The meaning of Kepler's three laws . . . remained a mystery until Newton's discovery of the law of universal gravitation."

[11] Quoted from W. F. Magie (Ed.): *A Source Book in Physics,* 1935, p. 213 ff.

[12] Quoted from E. A. Burtt: *The Metaphysical Foundations of Modern Physical Science,* Revised Ed., 1931, p. 57.

[13] Quoted from J. B. Stallo: *The Concepts and Theories of Modern Physics,* Second Edit., 1882, p. 17.

[14] *Ibid.,* p. 21.

[15] Quoted from J. Ward: *Naturalism and Agnosticism,* 1899, p. 119.

[16] Quoted from W. H. Watson: *On Understanding Physics,* 1938, p. 69.

[17] Quoted from H. Shapley and H. E. Howarth (edd.): *A Source Book in Astronomy,* 1929, p. 169.

[18] I. M. Freeman: *Modern Introductory Physics,* 1948, p. 123.

[19] Watson, *op. cit.,* p. 68.

SELF-INTEREST AND DUTY

By Jonathan Harrison

Egoism, the theory that our only duty is to try to produce as much good for ourselves as we can, may take two forms, according to whether our happiness is conceived to be the only good thing we have a duty to seek, or other things, such as knowledge, are also thought to be good. It is with the former of these two varieties of egoism, egoistical hedonism, that I shall chiefly be concerned.

Neither form of egoism can be rejected as inconsistent.[1] It is true that everybody's happiness or knowledge cannot be the only good, and it is unreasonable to maintain that my happiness, or my knowledge, is good, though not that of others, but there is no reason why the egoist should adopt either of these positions. So long as he is prepared to hold that we may have a duty to sacrifice the greater good to the less, he may maintain that, though other people's happiness and other people's knowledge is as good as ours, we only have a duty to produce our own.[2] That the greater good should be sacrificed to the less is only what many philosophers have maintained for more high-minded reasons.

Egoistic hedonism, according to which I always and only ought to seek my own maximum happiness, must, of course, clearly be distinguished from psychological hedonism, according to which I always and only do. Egoistic hedonism is not entailed by psychological hedonism; neither is it incompatible with it. Professor Broad[3] (following Sidgwick) has argued that, if psychological hedonism is true, I cannot have a duty to do anything which I think will not produce my happiness, for I cannot do this; nor can I have a duty to do anything which I think will produce my happiness, because I cannot do anything else.[4] However, psychological hedonists need not hold that I always only can do what I think will maximise my happiness, but merely that I always only shall. It is all I shall do only because it is all I want to do; I am not prevented, by physical or mental limitations, nor by adverse external circumstances, from doing anything else; if I wanted to, I could. The picture of a man who wants only his own happiness struggling from a strong desire to do his duty to perform an action which he thinks will not conduce to it, yet prevented from success by the fact that his happiness is all he wants, is not a convincing one.

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[1] Moore (*Principia Ethica*, pp. 97-8) holds that it can.

[2] See Broad, *Five Types of Ethical Theory*, pp. 243-4.

[3] *Five Types of Ethical Theory*, pp. 181-3.

Either form of egoism is, of course, considered by the standards of common sense morality, far from plausible. We all think we have many duties, the most mundane of which are to keep our promises, pay our debts, and to consider the interests of others, and few think that such things cease to be duties when we can make ourselves happier or wiser by doing something else. Some egoists have been prevented from recognising the force of these difficulties by a confusion. Egoistical hedonists have pointed out that we are so constituted that we cannot ignore our duties and be happy; other sorts of egoists that among the good things which we have a duty to realise for ourselves is that good which we obtain by doing our duty. If it can be maintained that this happiness is the greatest of all happinesses, or this good the greatest of all goods, then an egoist of either sort may feel that he can, consistently with his principle, give an account of all the duties which ordinary people recognise.

Doing my duty sometimes makes me happy—though, if I am evilly disposed, not doing it may make me happier still, and doing my duty does realise in me a good. However, that an action produces for me this happiness or this good cannot be the reason why it is a duty. To produce the happiness which comes of the feeling one has done one's duty, or to produce that goodness of character which people who do their duty have, an action must already be a duty, and so cannot be a duty for the reason given.

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[4] Both Broad and Sidgwick think this conclusion does not follow if psychological hedonism will allow that I may wittingly or unwittingly prefer what will give me less pleasure. I do not see how a man whose choice is determined only by the expectation of pleasure can wittingly prefer a lesser pleasure, and if the preference is unwitting he can neither have done his duty nor failed to do it.

Though to produce my own happiness cannot be my only duty, it may, nevertheless, be a duty. (I shall say no more about non-hedonistic egoism.) Most of us do recognise such a duty, and we are right. Some philosophers, however, have spoken as if interest were irrelevant to duty; some even as if it were a distinguishing mark of duty that it was quite independent of interest. Here they are surely mistaken. If I have a duty to give to the poor, how much I ought to give depends upon my income. A rich man can give more without hardship than a poor man; hence he may have a duty to give more. My argument is not even invalidated if we have a duty to give all we have to the poor; if our own interest counted for nothing, what would there be to prevent us from having a duty to give all that we have to the rich? The truth is that we are, all our lives, faced with the problem of striking a proper balance between our own happiness and that of others when they conflict. We should certainly not always sacrifice the interest of others to our own, but neither should we always sacrifice our own interests to those of others.

Some philosophers may have held that interest is irrelevant to duty because they have confused interest with inclination. I am not, however, always inclined after my interest, and, when I am, I may have other inclinations which are stronger. This point was made forcibly by Butler. To seek my own interest is not necessarily, and perhaps not often, to follow the line of least resistance. It is therefore possible to try to preserve one's happiness, not from inclination, but from duty. Sometimes—for example, in the case of the dipsomaniac or drug addict who must fight a temptation to indulge for no better reason than that his interest requires it—such behaviour may be highly praiseworthy.[5]

It has been doubted whether even inclination is irrelevant to duty. Inclination, it has been said, may be highly relevant to the choice of a wife or a career. However, that inclination is irrelevant to duty may be maintained if we draw a distinction. Those philosophers who have asserted the irrelevance of inclination to duty have done so because they thought, rightly, that no contrary inclination, however strong, can absolve me from doing my duty. Those who have maintained that inclination is relevant have not denied this. According to them, no inclination can make it right for me not to do my duty; it can only cause something not to be my duty, which otherwise would be. The same is true of interest.

Some things are duties because it is in the interest of the agent to do them, but this is not the only reason why a thing should be done; still less is it the reason why duty should be done. There is no reason why duty should be done.[6] That an action is a duty is a sufficient reason for doing it, and it is absurd to ask for something (e.g., that it promotes the agent's interest) to justify us in doing that for which we already have a sufficient reason. This is not, however (as has sometimes been thought) to say that the promotion of the agent's interest is not a reason for doing an action which is a duty. If that an action is a duty causes one to have a sufficient reason for doing it, then that, in addition, it is in one's interest, causes (by the addition of a reason not sufficient) one to have more than sufficient reason for doing it. More than enough food and drink may be bad for one, but more than enough reason for a statement does not make it false or invalid, nor does more than enough reason for an action make it wrong or irrational. If one person has a duty to do something which is in his interest, and another has a duty to do something which is not, the first has better reason for doing the action he has a duty to do (though no better reason for doing his duty) than the second, though the reasons of both are sufficient.

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[5] This was a point Kant was fond of making. It seems unlikely, therefore, that he was a psychological hedonist.

[6] The question 'What are the reasons why an action is a duty?' should not be confused with the question 'What are the reasons for doing it?'. That a thing is a duty is a reason for doing it, but not a reason why it is a duty. It is a mistake to consider the second question as more important than the first; a still greater mistake to regard all attempts to answer the first question as misguided efforts to answer the second.

There is no antinomy between duty and interest in any sense other than that they may lie in different directions. Interest is a part of duty in the sense that to seek my interest is one duty among others, and between duty and a part of duty there can be no conflict. It would be as sensible to speak of an antinomy between duty and promise-keeping, or between duty and honesty, as between duty and interest. To seek my interest is not always my duty, but neither is to keep my promises or tell the truth. So far from my duty to seek my interest conflicting with my duty to do my duty, it does not make sense to speak of having a duty to do my duty. As particular duties may conflict, my duty to seek my interest may conflict with others, but this is not a conflict between duty and interest, but between one duty and another, and is just a special case of the problem of the conflict of duties, which can be solved.

Butler thought that it was always in my interest to do my duty.[7] Actions, *qua* virtuous, are always rewarded in this world, and, *qua* vicious, punished. If virtuous actions are sometimes followed by misery (or vicious actions by happiness) this is not because they are virtuous (or vicious), but because of something else—what Butler calls "accidental" causes.[8] Such partial correspondence between virtue and happiness in this world points to a complete correspondence between them in the next.[9] Neither in the *Analogy* nor in the *Sermons,* however, was Butler an egoistical hedonist. Had he been one, he would have thought that actions were virtuous because they were rewarded, whereas he clearly holds that they are rewarded because they are virtuous. He attempted, in the *Sermons,* to defend the claims of virtue from the cavils of sceptics and atheists by arguing that virtue is itself a manifest obligation, and that ignorance of the penalties of vice does not absolve us from the demands of virtue, or excuse us for neglecting them.[10] How could an egoistical hedonist maintain this? Butler thinks that we often know that an action is virtuous, and infer that God will reward it.[11] Had he been an egoistical hedonist, he would have maintained that knowledge of what God will reward and punish must precede our knowledge of what is virtuous and what is not.

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[7] *Sermons* (Ed. Gladstone), pp. 63-4.

[8] *Analogy,* Part I, Chapter III.

[9] *Ibid.*

He thinks that though, when the next world is considered, it is always in my interest to be virtuous, actions are not virtuous only because they are in my interest. When an action is virtuous, for any reason, it will be rewarded, and therefore it is in my interest to perform it; therefore it will become my duty for a further reason. My interest in the next world, however, does not create my other duties, but only reinforces them. To what extent Butler thought my duties would be different from what they are now, were there no God, I do not know, but he certainly thought that many, perhaps the majority of them, would remain, though it might no longer always be in my interest to perform them.

Is there, however, no danger in Butler's view? Though Butler does not base all our duties on our interest in this world or the next, there is, I suppose, the possibility that, if we believe what he says, actions which should be performed from kindness or from duty will be performed from calculating self-regard. Two points may be made in Butler's defence. As I have already maintained, and as Butler himself knew, "calculating self-regard", if we insist upon a derogatory epithet, may not only be a duty, but may be a duty difficult to perform.

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[10] *Sermons,* p. 15.

[11] *Sermons* II and III.

Secondly, regard for the next world is not, according to Butler, always or necessarily calculating self-regard. It is a manifestation of certain affections—love, reverence, trust, desire or approbation—which only God can adequately satisfy, and in the satisfaction of which, more fully to be attained in a future state, our greatest happiness consists.[12]

Though, on the view I am maintaining, duty and interest may lie in different directions, there is no antinomy between them in the sense that, when they do, it is somehow rational to pursue both. Sidgwick held that there was an antinomy between virtue and interest in this form, and even tentatively suggested an argument for the existence of God resting upon it.[13] If I intuit that if duty (for Sidgwick, Utilitarian duty) and interest were to lead in different ways, it would be rational to follow both, these inconsistent intuitions could only be reconciled if there was a God who, by means of rewards and punishments, saw to it that virtue and interest always coincided.

This argument has been severely criticised by Professor Broad.[14] "No God", he says, "however powerful and however benevolent, can alter the fact that these two principles are logically incompatible, and that therefore something which seemed self-evident to Sidgwick must in fact have been false." The most He could do would be, by causing virtue and happiness always to lie in the same action, to make it a matter of practical indifference upon which principle we acted. Though it might comfort someone in Sidgwick's predicament to think that this is what He does do, it is not enough to justify us in postulating His existence.

Broad's refutation would be final if Sidgwick's two principles were logically inconsistent with one another, but they are not. It is a common error to suppose that two hypothetical propositions with identical antecedents and incompatible consequents are incompatible. They are not; they are together incompatible with the truth of their common antecedent. From the premises "If virtue and interest conflict, it is rational to be virtuous" and "If virtue and interest conflict, it is rational to follow interest" the conclusion "Virtue and interest do not conflict" follows. If we further grant, what seems plausible, that if there were no God, virtue and interest would conflict, we may finish with an argument in the *modus tollendo tollens* concluding that there is a God.

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[12] *Sermons* XIII and XIV.

[13] *The Methods of Ethics*, Concluding Chapter.

[14] *Five Types of Ethical Theory*, pp. 253-6.

This is the only argument, using ethical premises, for the existence of God known to me which is valid and not circular, though doubtless others might be invented. It is not, however, a satisfactory proof. If it is rational to seek my own interest, it must be in the sense that it is prudent, and if it is rational to be virtuous, it must be in the sense that it is right. In the sense in which it is rational to be virtuous, it is not always rational to seek one's interest, and in the sense in which it is rational to seek one's interest, it is not always rational to be virtuous. Sidgwick was perhaps prevented from seeing this by his use of the vague word "rational" in places where "right" and "ought" would have been more appropriate. Hence it is not quite clear whether he really regarded the "antinomy" just stated as one between virtue and interest, or as between two principles of duty, to seek maximum happiness for oneself and for mankind.[15] If this latter interpretation is correct, instead of both premises being true, but not constituting an antinomy of the required sort, or the one being true only in the sense in which the other is false, both premises are very likely false. It is quite certain that it is not always our duty to seek our own happiness, and very probable that we should be concerned about things other than the happiness of mankind. Sidgwick's premises, however they are interpreted, are only both true when their antecedents are not incompatible. No antinomy exists, either between one branch of duty and another, or between duty as a whole and interest.

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[15] Professor Broad seems to adopt this latter interpretation. Sidgwick, in some places at least, quite clearly regards it as a contradiction between duty and interest.

CRITICAL NOTICES

INTRODUCTION TO LOGICAL THEORY. By P. F. Strawson. (London: Methuen & Co. Ltd.; New York: John Wiley & Sons, Inc. 1952. 266 pp.) Price, 15s. net. Australian retail price, 25s. 6d.

THIS painstaking piece of writing is, perhaps, the most satisfactory examination that has yet appeared of the respective claims of "traditional" logic and "modern" logic to present the logic of discourse. In view of the apparently moribund state of traditional logic and the uneasy supremacy of modern logic, its value consists in this rather than in its distinctively Oxford flavour, which may cause it to date badly. On the plan of the book the author comments (Preface), "I have included enough of the elementary material of formal logic to provide a basis for the philosophical discussion of its nature, and to serve, if desired, as an introduction to more advanced technical treatises". This balance of exposition and discussion is well maintained.

In his account of traditional logic, Strawson tries to avoid imposing on it an inconsistent interpretation and then accusing it of inconsistency. "If a certain interpretation of a system is inconsistent", he points out, "it does not follow that there are no consistent interpretations of it. (This fact is important in view of certain current criticisms, founded on misinterpretations, of traditional logic)" (p. 63). The most serious and most widespread of these misinterpretations is the view that, of the four forms of the traditional schema, the A and the E do not have existential import. However, Strawson proposes that the existence of members of the subject-class alone is to be regarded as presupposed (p. 176), a proposal which he thinks leaves the validity of simple conversion of the E and the I forms still suspect (p. 177). A satisfactory solution to problems such as this would require that *both* subject and predicate expressions be genuine terms.

Strawson also corrects the common view "that the traditional logicians confused two quite different relations, namely those of class-inclusion and class-membership; that they mistakenly assimilated class-membership statements to class-inclusion statements". He points out that statements of the A form are not to be regarded as "class-inclusion statements, in the sense given to this phrase by modern logicians" (pp. 179-180). But again he does not get to the root of the matter, as may be seen from his observation that the "formal analogies" of singular propositions and other propositions are not "thoroughgoing", inasmuch as "we do not, in the case of singular statements, find a plausible analogy to, e.g., the rule that A entails I" (p. 181). It is obvious from this that Strawson does not dissent from another common assumption, that distribution in space is to be taken into account in interpreting the subject-predicate form, but not distribution in time. Even in everyday speech we find sentences like 'Caesar is always resourceful' and 'Caesar is sometimes angry'; and if the quantity signs of the traditional forms are understood in their most general sense, there seems to be no reason why they should be considered appropriate to terms which have instances in different places at the same time and not to terms which, while they lack this feature, have instances in the same place or in different places at different times. On the contrary, in the most general system of logic, which of these "types" of instance gave sense to the quantity signs would be irrelevant: as exemplifications of the general entailment, Any proposition of the A form entails the corresponding proposition of the I form, we should have both All Caesars are resolute entails Some Caesars are resolute and All men are fallible entails Some men are fallible. Since we are concerned, in the first instance, with the most general system of logic, we should not be troubled by the fact that at this level singular terms are not formally distinguishable from general terms.

On this view it is possible to regard singular terms as having extension (Roman governor who conquered Britain in

55 B.C. would, e.g., be part of the extension of Caesar), and if we reject the doctrine of indefinables or, more generally, of terms which have no intension, we can lay down as two principal requirements for a consistent interpretation of the traditional logic: (1) the traditional schema requires that every subject or predicate term be a genuine term or have both extension and intension, where to say that P has extension is to say that there are true propositions of the form X a P and to say that P has intension is to say that there are true propositions of the form P a X; (2) the traditional schema does not allow that any proposition be understood in an exclusively extensional or in an exclusively intensional sense; on the contrary, while any proposition is relevant to both the extensive relations and the intensive relations of its terms, no proposition *states* such a relation. For example, the proposition All human are rational does not state either a relation between the extension of human and the extension of rational or a relation between the intension of human and the intension of rational; but its truth would be sufficient to show that either human and rational are coextensive or human is extensively included in rational and that either human and rational are cointensive or rational is intensively included in human.

Further, the theory of extensive and intensive relations involves no departure from the doctrine of the four forms, because a full and accurate statement of any such relation involves a reference to syllogism. For example, to say that human and rational are coextensive is to say that, given as minor premises true propositions of the form X a human and X a rational, valid syllogisms can be constructed having as their respective conclusions true propositions of the form X a rational and X a human, inasmuch as the required major premises (the conditions of coextension), All human are rational and All rational are human respectively, are true. If we had wanted to say that human and rational are cointensive, we should have had to use predicate variables instead of subject variables and the conditions (now conditions of cointension) would have functioned as minor premises.

Such an interpretation of the traditional logic would involve neither the inconsistencies which are commonly ascribed to it nor the difficulties which Strawson finds in it. But what would, perhaps, prevent Strawson from accepting it are his doctrine of subject and predicate and his related doctrine of referring and describing.

In his exposition of modern logic, Strawson brings out the essentially "symbolic" character, as contrasted with philosophical character, of modern system-construction. I doubt very much, however, the wisdom of his giving a truth-functional interpretation of the "abstract" (uninterpreted) calculus before a sophisticated form of the Boolean class-interpretation. He certainly presents the truth-functional system (Chapter 3) very clearly, first explaining the constants and deriving the theorems by the tabular method, then comparing and contrasting the truth-functional constants with ordinary words of similar meaning, and finally defining other constants by the stroke-function and introducing logical relations in order to derive the theorems by the deductive method; again, in Chapter 4 the tabular method is used to show that the attempt to develop the logic of classes simply as a second interpretation of the same calculus is not altogether successful (pp. 134 ff.). But despite the suggestiveness of this procedure it seems to me that this is one of several places in which reference to, if not preservation of, the historical order would assist both exposition and discussion.

The notion that genuinely logical principles (principles about strict entailment, strict inconsistency, etc.) are derivable from truth-functional principles by the addition of some determinant such as "analytic" (cf. p. 94) is now so firmly embedded in logical theory that genuine doubt about the priority of truth-functions is scarcely entertained, and consequently the question of the origin of the doctrine of truth-functions may be thought irrelevant not only to calculus construction but to theory. But it is by no means evident, except to those who are in the "modern" tradition, that a logic which requires as a metaphysical support (for truth-functions and functions derived from them) the independent existence of a class of things called "propositions" with the characters "true" and "false" is anything but logic turned upside down; and while it may be true that the attaching of certain linguistic expressions such as "analytic" to other expressions which are used to assert functions of these fictitious entities may be so understood as to provide linguistic devices which can be used to perform certain logical tasks (cf. Strawson himself, on "fabricated expressions", p. 57), this does not mean that the original metaphysical error has been cancelled out or that a new one has not been committed in the suggestion that the expressions 'analytic', 'necessary', 'tautologous', etc. refer to some actual feature of propositions or sentences. These expressions depend for their meaning either on metaphysically indefensible truth-tables or on the very sort of logic that modern logic claims to have superseded.

The makeshift character of modern logic also becomes apparent in Strawson's indications of how the problem of expressing not only "analytic sentences" but also "law sentences" in a thoroughly truth-functional symbolism might be solved (pp. 217 ff.). These sentences can be translated, Strawson suggests, only by the employment of various *ad hoc* devices, such as "not including in the premises of our system any but law statements" (p. 226), which, of course, would involve a departure from "formalism" and from "logic" as it is understood nowadays. No doubt any logic could be made to work if its users were granted the liberty of *adding* the requisite techniques whenever they encountered a problem insoluble in the system as it stood. But this really amounts to the abandonment of any testing of logic in the strict sense of the word, and it serves only to increase the divergence between logic as method and logic as theory of existence, which, during the last fifty years, has weakened the study of both logic and philosophy in all the leading schools. Strawson is far too mild, when he concludes his discussion of these questions with a warning against the "too indiscriminate use, in philosophical analysis, of modern logical symbolism" (p. 223).

In Chapter 5 Strawson rounds off his account of modern logic by attempting to show, first, that "those laws of the class system which can be directly established by the tabular method are, in a sense, simply special cases of the corresponding laws of the truth-functional system" and that those which cannot are "closely connected with others which are"; second, that, using individual variables, predicative variables and quantifiers, "we can make more perspicuous the connexion between truth-functional laws and class-laws" (p. 125). To illustrate the first of these points he gives a derivation of $\alpha\beta \subset \alpha + \beta$ from $p . q \supset p \vee q$ (pp. 126-127), and to illustrate the second he gives the corresponding derivation using the new notation (p. 135):

(i) $p . q \supset p \vee q$
(ii) $fx . gy \supset fx \vee gy$
(iii) $fx . gx \supset fx \vee gx$

But it is difficult to see in what sense Strawson can be said to have made good his first claim. If the metaphysical basis of the truth-functional interpretation of the calculus is taken seriously (that is, not arbitrarily excluded from the system proper, as it commonly has been since *Principia Mathematica*), an equivalent form of (i) in the above derivation is

(ia) $\mathrm{T}p . \mathrm{T}q \supset \mathrm{T}p \vee \mathrm{T}q$,

where T stands for *is true,* a constant predicative function; and this form of (i) and (i) itself can be derived from (ii) by the following steps:

(ii) $fx . gy \supset fx \vee gy$
(iv) $fx . fy \supset fx \vee fy$
(v) $fp . fq \supset fp \vee fq$
(ia) $\mathrm{T}p . \mathrm{T}q \supset \mathrm{T}p \vee \mathrm{T}q$
(i) $p . q \supset p \vee q$

This mode of derivation is not only possible; it also brings out what is the case, the implicit metaphysical dependence of the calculus of "unanalysed propositions" (as presented in modern logic) on the calculus of "analysed propositions", and it indicates how method, which is concerned with the true and the false, the "existent" and the "non-existent", depends ultimately on a theory which can be stated without any reference to the false and the non-existent. It is only by loose analogy with other predicates and functions that true and false and the functions which depend upon them can be understood, and that the logic of truth-functions could be said to be "correct" in any sense of the word. Modern logic, unlike the traditional logic which is more closely related to discourse (cf. Strawson's remarks in Chapter 6), has not reached a point where we can afford to leave its origin out of account. The origin of modern logic in the attempts of Boole and his successors to interpret his class-relation algebra as an algebra for relations between propositions gives a clue to the dependence of modern logic on a false metaphysic. The view that being false is a way of being true (a truth-value) originated in the treatment of lack of class or extension as a way of having class or extension. Material functions are given a bogus independent status when their historical origin is not dealt with, especially in an introductory work on logical theory.

With regard to the respective claims of traditional logic and modern logic to present the logic of discourse, Strawson's general conclusion is that neither claim can be justified. This conclusion may be true; but whether it is or not seems to me to be independent of some of the questions Strawson raises. For example, Strawson's "natural syllogism", which he asks the reader to compare with "the stiffly unreal examples of the text-books" (p. 194, n. 1), runs:

> "— A man has just drunk a whole bottle of methylated spirits.
> — No one who takes a dose like that ever survives it.
> — So he'll die."

Formally, all that matters, even though there is a change from an "indefinite first term" ("a man") to the definite pronoun ("he") is that either the same term or coextensive terms are involved, and contrary to what Strawson says on p. 179, note 1, logically that is all that matters, too. The other question that arises here is one of meaning, rather than one of pure logic, and even though meaning, like any other relation, has logical features, it would be as well, in my opinion, to couple another warning with Strawson's warning against the "too indiscriminate use, in philosophical analysis, of modern logical symbolism", viz., a warning against undue respect, in philosophical analysis, for the conventions of natural languages.

On one rather more important question, that of "relational inferences", linguistic eclecticism again prevents Strawson from advancing the discussion, even though he states certain features of the problem clearly. "Admittedly", he says (p. 53), "we can always frame a rule for such types of inference in terms of a *manufactured* constant: e.g., '-trans' in

'x R-trans y and y R-trans z' entails 'x R-trans z'.

But to talk of ordinary sentences exemplifying the formula 'x R-trans y' has a different kind of artificiality from that of the stretched use of 'exemplify' which allows us to say, e.g., 'Tom is not mad' exemplifies 'not-p'." The difficulty with relational inferences is, of course, that there is not at first sight any general set of formal features which could be regarded as criteria of their validity, and the artificiality of the constant '-trans' is that its meaning is just the validity of the argument. But Strawson's solution to the problem does not consist in analysing transitive relations in order to discover whether they have intrinsic formal features which could be made the basis for a *logical* account of them. He proceeds to attack the traditional notion of form as something independent of validity and to replace it with a notion of "formal powers": "But to say that a statement is of some one logical form is simply to point to a certain general class of, e.g., valid inferences, in which the statement can play a certain role" (p. 53). This amounts to abandoning logic, for it means that the difficulty, viz., circularity, which attaches to the justification of relational inferences in terms of, e.g., transitivity will attach to the justification of any argument: and the theory of implication will degenerate into the mere collection of conventionally recognised linguistic progressions.

I shall not dwell on the special problems which Strawson finds in attempts to convey by means of the various systems the nuances of meaning that can be conveyed in ordinary speech. A related, but more general, question is raised by the central thesis of the book, which is embodied in these two principles: first, "It is statements and not sentences that are inconsistent with one another, follow from one another, etc." (p. 9); second, it is "more convenient to do logic in terms of rules about representative expressions" than "in terms of logical relations between statements" (p. 27). The development of the second of these principles depends on a series of gradual transitions from a "logical" statement to a "linguistic" statement. However, two main steps may be distinguished, and, in order to avoid distortion, though still at some risk of it, I shall try to indicate these steps by quoting several key passages.

The first step from the logical statement,

> "any statement to the effect that a certain person is a younger son entails a statement to the effect that that person has a brother,"

to the corresponding linguistic statement is summarised in this permit: The forms of words,

> "(1) 'x is a younger son' entails 'x has a brother' and
>
> (2) 'Tom is a younger son' entails 'Tom has a brother'"

may be regarded as "shorthand ways of making statements about *statements*: viz., about statements made by the use of the quoted sentences of (2), or by the use of the sentences which could be obtained by substitution in the quoted formulae of (1)" (p. 31).

The second step is made in the following passage:

> "It is, as we saw, statements or groups of statements, not sentences or formulae, to which words of logical appraisal are correctly applied;

> we have given no meaning to talk of *sentences*, or *formulae*, entailing one another. There is, however, no reason why we should not use the word 'entails' *in a new, though related, sense,* for (i) that relation which one *formula* has to another when statements made by the use of sentences obtainable by substitutions in the first formula each entail the statements made by the use, in the same context, of sentences obtained by corresponding substitutions in the second; and (ii) that relation which one sentence has to another when a statement made by the use of the first entails the statement made by the use, in the same context, of the second.
>
> In this new sense of entailment we *shall* be able to talk of entailments between formulae or between sentences; and (1) and (2) need no longer be regarded as abbreviations. In the same way we can give analogous senses to the other words of logical appraisal . . ." (pp. 31-32).

The question which immediately arises is: If the first principle is sound, if it is to statements or groups of statements that words of logical appraisal are correctly applied, can we be said to be "doing logic" when we follow the procedure laid down by the second principle and concern ourselves with postulated "analogous senses" of these words when they are applied to sentences or groups of sentences? It seems to me that we cannot, unless we can show that the "new, though related, sense" of "entails", for example, is still a *logical* sense. If it is a logical sense, then, unless the restriction to sentences makes a difference, it would appear that we shall have the same difficulty as Strawson thinks we had before, viz., that our discussion will become "progressively more unwieldy" (p. 27, cf. p. 42); but if the restriction to sentences does make a difference, we shall have the problem of explaining how it is that this difference does not also prevent the relation from being a logical one.

It seems to me, then, that Strawson should either insist on his first principle and work out his logic consistently with it, putting up with the unwieldiness, or abandon that principle and maintain that words of logical appraisal apply exclusively to sentences or groups of sentences. In that case his method of exposition would at least be consistent with his view of what he is expounding. But even though Strawson is reluctant to adopt a straightout nominalist position, because he does not, for example, want to describe sentences as true or false, it is worth pointing out that his defence of his first principle, that words of logical appraisal are applied to statements or groups of statements, is rather precarious, depending largely on "accidental" factors, such as the various uses to which sentences are put and the variety of statements a sentence may refer to in various contexts even though its "meaning" is constant, as in the case of a sentence which contains a pronoun such as "I" or "you" (pp. 3 ff.). Incidentally, much irrelevant clearing of the ground would be avoided if, in logic, a sentence were regarded as a set of words and other signs (e.g. the speaker's time and place, his pointing with the finger), or a set of words in which other signs have been reduced to words, *which refers unambiguously to a single statement or issue,* because Strawson's "context" would in practice be only arbitrarily distinguishable from other social factors involved in the thought-conveying function of language. But the important point is that, as an element in the dispute between nominalism and realism, emphasis on the variability of reference which a sentence with a single meaning may have leaves the main issue untouched, and what would have to be shown is that, even if all sentences referred unambiguously to single statements, still we could not, without encouraging confusion, describe sentences as inconsistent, for example, any more than we could describe them as true or false.

So far as I can make out, Strawson's claim to be "doing logic" stands or falls with his assumption that "behind every particular statement of logical appraisal stands a general rule for the use of words" (p. 27) :

> "The first factor limiting the logician's task is that he confines himself to making general entailment-statements. One sees how it is that he can do this if one remembers how logical appraisal becomes possible. Every particular entailment-statement is an exemplification of a general entailment-statement; for behind every particular statement of logical appraisal stands a general rule for the use of words."

There is a trivial sense in which Strawson's view is true, viz., that without general rules for the use of words there could hardly be any statements at all because statements are commonly made by means of words. But that his view is more specifically nominalist in character is borne out by his attempt in Chapter 1 to show that inconsistency, and other terms of logical appraisal which may be defined by means of it, depend on rules for the use of words.

> "Let us give the name 'incompatible predicates' to any pair of expressions the application of which to the same person or thing at the same time results in inconsistency. Thus we can say that one of the ways in which it is possible to say something inconsistent is by applying incompatible predicates to the same person or thing at the same time" (pp. 4-5).

By a "predicate" Strawson means something linguistic (cf. p. 5: "But must a language have incompatible predicates in it?"). So the question, 'What makes inconsistency possible?', is made to depend on the question, 'What makes predicates incompatible?' (p. 5). In answering this question, Strawson first of all points out: "Somewhere, then, a boundary must be drawn, limiting the application of a word used in describing things; and it is we who decide where the boundaries are to be drawn" (p. 5). Further,

> "When we apply a predicate to something, we implicitly exclude from application to that thing the predicates which lie outside the boundaries of the predicate we apply, but in the same incompatibility-range. By this I mean that if we go on to apply to the thing, in the same breath, one of the predicates which lie outside those boundaries, we shall be taken to have contradicted ourselves, and said nothing. (This might be taken as a definition of 'incompatible predicates')."

With this function of implicit exclusion he contrasts that of "explicit exclusion", indicated, e.g., by "not" (p. 7). "It is then," he concludes (p. 9), "our own activity of making language through using it, our own determination of the limits of the application of words, that makes inconsistency possible . . . ."

In choosing inconsistency as an illustration, Strawson weights the scales in favour of the nominalist view. Inconsistency is notoriously a difficult notion for the realist because no such relation is found among facts. But suppose we take seriously the suggestion that predicates are merely linguistic: what then can be made of the statement that one predicate excludes another? Apparently, that we should not put a conjunction sign between them if we desire to avoid meaninglessness. But this meaninglessness depends in turn on the not-necessarily linguistic fact that the terms referred to by the words in question exclude one another. The nature of a range itself, as Strawson points out and emphasizes by his choice of example, is not always sufficient to explain why we have come to apply a certain word up to a certain point in it and to refrain from applying it beyond that point. But that does not alter the objective fact that some sets of points in the range exclude other sets, some sets include others, and so on; and even if we are often in disagreement about the meanings of words rather than about these facts, it is these facts that explain not only how a meaningless usage is possible but also how a straightout inconsistency in statements or propositions is possible. In his opening remarks Strawson says that the distinction between the criticism of untruth and the criticism of inconsistency is that while the former "refers beyond the words and sentences the man uses to that in the world about which he talks", the latter "does not in this way refer to anything outside the statements that the man makes" (p. 1). However, it seems to me that even when the inconsistency is most formal and most explicit, our detection of it has reference to something "in the world", whatever difficulty there may be in formulating it. For example, if someone (Strawson's "lunatic"?) says, "This book is blue and it is not blue", our accusation of inconsistency presupposes the objective fact that No pairs of terms which are Subject and Predicate respectively of a true proposition (fact) of the form S is P are pairs of terms which are Subject and Predicate respectively of a true proposition (fact) of the form S is not P. It would not advance the discussion to point this out, because a person who felt no difficulty in maintaining the original pair of propositions would feel no difficulty in maintaining the above-mentioned objective fact and its contradictory which is presupposed by his maintaining the original pair of propositions. But the fact of the matter is that contradiction "in the same breath" is not the way in which contradiction usually occurs; and we find an inconsistency in Strawson's own principles when he takes logicians to task "for framing unnatural-looking negative terms" (p. 8) while he himself frames contradictions "in the same breath". But if contradiction "in the same breath" did occur, its occurrence would depend on objective facts, not especially on meaninglessness. If it is said that these facts are "queer", the answer is, so is contradiction in the same breath.

Strawson does not substantiate his claim that logical appraisal depends on rules of linguistic usage. The main weakness in his position is his refusal to give a non-linguistic status to anything which smacks of generality. This is evident not only in his account of general logical statements but also in his distinction between words which refer and words which describe, which really amounts to a distinction between subjects as not necessarily linguistic and predicates as necessarily linguistic. In general, it is linguistic eclecticism that spoils Strawson's book. If there is such a study as logic, it will be the study of what is common to all fields, including languages, even though the theory of logic can be stated and tested only by means of language. One problem of the philosopher is to criticize the "logic" of ordinary language in the very act of using ordinary language. He must, of course, remember that the notion of a usage that could not mislead is a species of linguistic rationalism. But it is not immediately apparent that linguistic eclecticism is an advance on this.

T. A. ROSE.

GOD AND NATURE. By G. F. Stout. Edited by A. K. Stout; with a memoir by J. A. Passmore. (Cambridge University Press, 1952. liv + 339 pp.) Price (U.K.), 35s.

THE history of this book is as follows. The late G. F. Stout gave two courses of Gifford Lectures, in 1919 and 1921. He did not publish the lectures in the form in which they were delivered, nor apparently did he ever intend to do so. Instead, he formed the intention of writing two books, both based on the material of the lectures; one was to deal with the more purely epistemological issues discussed, the other with "more ultimate problems" of a metaphysical and theological nature. The first of these volumes, *Mind and Matter,* appeared in 1931, and quickly became well known and widely discussed. The projected second volume was, as it turned out, never written, but Stout left the MS. of his lectures to his son, Professor A. K. Stout, with the understanding that he should edit them for posthumous publication. *God and Nature* (the title is the author's own) consists then substantially of the text of Stout's Gifford Lectures, with certain omissions and modifications suggested by the author before his death, the omissions being due chiefly to a desire not to traverse again too much of the ground covered in *Mind and Matter*; but the final arrangement of the material is due to his son, who can (let it be said at once) rest assured that both filial and editorial obligations have been admirably discharged. The value of the volume is further enhanced by a frontispiece photograph of the author, and by an excellent Memoir by Professor J. A. Passmore, tracing the outlines of Stout's life and the development of his thought.

There are three themes of major interest in *God and Nature*: (i) There is a lengthy criticism of the Absolute Idealists on the one hand and the Neo-Realists, especially the early Russell, the Russell of *The Problems of Philosophy,* on the other, in which Stout defines his position on the metaphysical problem of the unity of the universe as lying between these two extremes. (ii) There is a long epistemological discussion, which deals in the main with issues similar to those discussed in *Mind and Matter*. (iii) There is a discussion of natural theology proper.

It can, I think, hardly be denied that the structure of the book (if one were to judge it by the standards appropriate to a book that had been prepared for the press by its author, which of course it isn't) leaves something to be desired. The work has, it is true, a unifying principle; and this unifying principle is to be found, as is right and proper in view of its title, in the third of the three themes I have mentioned—for what the argument is always leading up to, pressing on towards, is a defence of natural theology. But if that is so, the other themes bulk too large, there are too many digressions pursued for their own sakes, and the explicit theistic arguments, though carefully prepared for, are often too slight when they arrive. To say this is not to criticise the Editor; his policy ("I have", he writes, "in general preferred the risk of including what the author would finally have left out to that of excluding what he would have retained") seems to me beyond reproach. Nor is it to criticise the author; for what goes to make a good manuscript for a course of lectures (to say nothing of a manuscript from part of which one book has already been quarried) is not identical with what makes a well-constructed book. But the fact is so, nevertheless. There are, too, signs in *God and Nature* (and this may do something to explain its defects of structure) that Professor Passmore is right when he says in his Memoir that Stout was not completely happy in the field of metaphysics. In psychology and epistemology he felt at home, but metaphysics and natural theology were duties, albeit duties which he undertook with great earnestness.

In this review I am going to confine myself almost entirely to Stout's natural theology. I do so partly because this is the distinctive contribution of the book; and partly because, of the other two main themes, the second (the epistemological) has excited much discussion already, and the first, though it does indeed contain very acute criticism, is probably that part of the book which has least contemporary interest—it is necessary to bear in mind that *God and Nature* was in effect written about 1920, and it is not the early Russell's criticisms of metaphysics that worry us nowadays.

With regard to any natural theology we may in general ask two main questions: (*a*) what arguments does it offer for the *existence* of God? and (*b*) what does it go on to say about the *nature* of God, his relations to the world, and so forth? These two questions are only relatively distinct, or rather, the way in which the distinction has to be drawn varies from one natural theology to another. For in order to give any meaning to an argument for the *existence* of God, some *concept* of God must be employed. It is necessary, that is, to begin by arguing to the existence of a being of such and such a nature; then we may go on to argue that, granted the existence of such a being, he (or it) must have such and such further characteristics, or stand in such and such relations. Two natural theologies, X and Y, which agreed in the end that the divine attributes were *a, b, c* . . . *n,* might differ structurally in that, *e.g.*, X began by arguing to the existence of a being with attribute *a* and then deduced attributes *b, c* . . . *n,* while Y argued to the existence of a being with attribute *b* and then deduced attributes *a, c* . . . *n.* (Of course, the existence-argument might be held to establish the existence of a being with more than one of the attributes, but that is merely a complication of detail.) Let us call *a* and *b* the "basic concepts of God" in X and Y respectively; but note that "basic" here does not entail "most important", except from the point of view of the structure of the argument as a whole. Now Stout's basic concept of God in this sense is that of a "Universal Mind"; and I shall next try to outline the arguments he advances in support of the existence of God as so conceived.

There are at least six of these arguments in *God and Nature.* In addition there are three important points which

Stout makes in order to clarify his attitude to the formal arguments, and it will be well to draw attention to these first of all:

(*a*) The occurrence of religious experience is not itself, he holds, an *argument* for God's existence, nor is religious experience an argumentative sort of thing. Rather, religious people claim to have a certain *insight*. This claim is not to be accepted uncritically by the philosopher, but if on examination no rational objection is found to it, it must be allowed to stand. It is in fact, he holds, on a par with other pre-scientific beliefs like those in causality and in the existence of external objects.

(*b*) The formal arguments themselves, he says, are seen in their true light only when taken in conjunction with religious experience; *i.e.* their strength can be appreciated only when religious experience as well as rational analysis is brought to bear on them. I am in some doubt as to the precise meaning of this, and I shall have something more to say about it later on.

(*c*) The formal arguments are "convergent"; *i.e.* no one of them by itself suffices to establish the desired conclusion, but they support each other.

Now let us turn to the formal arguments themselves. I shall take these in my own order and I shall begin with those which are most characteristically "Stoutian". I shall find space for comments on only some of these arguments, and I shall as far as possible make my choice by avoiding discussion of Stout's epistemology, which would take us very far afield.

1. There is what might be called the argument from the irreducibility of mind; this is to be found especially on pp. 210 ff. This is the point at which the argument of *God and Nature* most clearly presupposes that of *Mind and Matter*. In that book Stout considered he had established that "mind cannot owe its existence to merely material conditions"; but in that case, he goes on to argue here, we must say positively that a mind which comes into existence must have its source in

something itself mental. He then distinguishes three theories which alone would meet this requirement: (*a*) the "mind-stuff" theory, which derives individual minds from primitive mental elements which are not themselves sufficiently developed or complex to deserve the title of "minds". Stout's main criticism of this theory is that it fails to account for the unity to be found in a human mind. (*b*) "Monadism"—the type of theory which "peoples the universe through and through with individual minds". Stout's general comment here is that "the same general grounds on which [such theories] rely lead up to the belief in a Universal Mind; and given a Universal Mind they are not strictly necessary". (*c*) The theory that finite individual minds derive from one Universal Mind—the theory which alone, he holds, is free from objections.

2. A perhaps even more characteristic argument, but one which is very difficult to summarise since something like half of *God and Nature* is in one way or another concerned with it, might be called the Idealist argument. Whatever his disagreements with the Hegelian brand of Idealism, Stout is willing to say, "I am so far an idealist that for me knowing and being are inseparably united as ultimate and coessential aspects of the universe as a whole" (p. 284). His main argument for this position lies, I think, in his extended discussion of sensa and matter. He there maintains (i) that sensa can exist only as perceived, and (ii) that sensa belong to the material world, that in fact the material world as a whole is continuous with and of the same nature as our sensa. From these propositions he draws the conclusion that the whole material world exists only as perceived by some mind. This is, as he recognises, a Berkeleyan type of argument. Where he differs from (or advances on) Berkeley here is in his answer to the question, What reason have I for believing in the existence of anything other than my mind and the sensa it perceives? His answer lies in an appeal to the principle that whatever we perceive we perceive as "essentially incomplete", as requiring to be supplemented by a context if even it itself

is to be understood. This essential incompleteness ultimately drives us, he contends, to regard the unity of the total universe as presupposed by the fragmentariness of our partial experience of it. If then, the argument runs, the universe is a unified whole which extends indefinitely beyond our own sensa, and if the universe can exist only as known by some mind, it follows that there must always have been knowing minds or a knowing mind. (Strictly, the most that could be said to follow is that there have been minds or a mind as long as there has been a material world; but since Stout appears to hold that the material world has always existed, this would presumably not disturb him.) But to assume only a plurality of finite minds will not do as an ultimate solution, for as has been already argued one Universal Mind is required to account for *their* existence.

3. A further argument, intimately connected with the preceding, is succinctly stated on pp. 286-8. It is this: Our immediate experience is of objects apprehended as essentially incomplete. To apprehend them *as* incomplete presupposes the conception of the universe as a wider unified whole. (Without such a conception, he argues, we cannot account for the existence and development of our knowledge.) But this raises the problem, where do we derive this conception of the universe as a whole from? Not, says Stout, from our immediate experience, for this gives us only fragments of the world in isolation from the rest. And his conclusion is that the one hypothesis which will remove this difficulty is that our finite minds have their source in a Universal Mind which "communicates to its finite creatures its own omniscience, so far as this is compatible with their finitude".

4. Stout also offers a re-statement of the traditional Argument from Design. Forms of this argument which are based on analogies between the behaviour of man-made machines and the course of nature he regards (rightly, I should think) as too crude to carry conviction, but he seeks to overcome this crudity and thus to re-instate the argument by two moves:

(*a*) He argues to the teleological character of the world of nature on the ground that the human mind, which is clearly teleological, must be regarded as an integral part of a wider system which must therefore be teleological too. The point here is that our minds do not function in isolation: we think, we make things, and so forth, but in order to do so we require the continual cooperation of the material world with our minds, and unless the material world were itself teleological it could not afford us the cooperation it in fact does. (*b*) He argues that "teleological order belongs to mind by its own intrinsic nature and that it does not belong to mere matter by its own intrinsic nature" (p. 262). "As a mere matter of chance, the odds are immeasurably against" nature's being organised in the teleological way in which it is in fact organised. This provides "at least a strong presumption"—he will not put it any higher—"that the teleological order of nature in general has its source in mind".

In assessing this argument we shall have to pay attention to what Stout means by "design" or "teleology". It is not always sufficiently recognised that the phrase "the argument from design" commonly covers at least two different types of argument. The ambiguity is there in the word "design" itself, which can mean either "pattern" or "purpose". There is an argument for the existence of God which starts from the orderliness of nature, its conformity to natural laws, without any special reference to ends or purposes at all, and argues that it is wildly improbable that nature could have got into such an orderly state by itself; and there is another argument which takes its stand explicitly on the (actual or apparent) end-seekingness of parts at least of the world of nature, and argues that if things which can't themselves form purposes act in an end-seeking way, there must be some being which does form purposes which makes them do so. Probably the first argument would begin most naturally from physics, and the second from biology; but either might be called an "argument from design". It would, I think, be commonly held that the initial premises of the first argument are easier to establish than those of the second (for it is easier to deny end-seekingness in nature than to deny pattern altogether), but that the transition from these premises to the existence of God is more plausible in the second case than in the first.

Be that as it may, I mention this distinction in order to draw attention to the fact that Stout's version of the argument is a little unusual in that although he uses (with apologies) the word "teleological" (which would suggest the second type of argument pure and simple), the kind of orderliness on which he bases his argument seems to lie half-way between the two types I have mentioned. He says it "does not consist simply in conformity to general laws of causation" but that it is "a systematic order of and in the concrete complexity of particular things and processes", to be found in varying degrees in different objects, "in a very high degree in the living brain, hardly at all in . . . shot rubbish", though each is "equally conformable to causal law" (p. 258). On the other hand, his instancing of the "beautifully teleological order of chemical combinations and reactions" makes it clear, I think, that he means something less than end-seekingness, though of course what is commonly called "teleology" in the stronger sense of the word would be included.

It is perhaps not very difficult to see the sort of thing Stout has in mind here, though it is difficult to make the notion quite precise, and I suspect Stout was not completely satisfied with his own attempt to do so. But the interesting question is why he should have attached so much importance to teleology in this sense. I presume (though he does not say so explicitly) that he would reject what I have called the first form of the argument (the argument from pattern); for if he regarded it as valid the whole elaborate proof that nature is teleological would become otiose—one would need only to point to the existence of natural laws; and his statement that "it is accidental to the nature of matter as such, however completely it may obey causal law, that its parts should be combined and interrelated in this [*sc.* teleological] way" seems plainly to imply that he thinks it *is* essential to the nature of matter as such that it should obey causal law, and that therefore *this* fact about it does not bear witness to its having a mind as its source. But if that is so, it is difficult to see why behaviour such as chemical reactions[1] should be held to provide such evidence. Indeed, the only kind of behaviour which might plausibly be held to be on a different footing here would seem to be teleological behaviour in the strong, supra-Stoutian sense; for ostensibly purposive behaviour in non-purposive beings does so strongly suggest the existence of a superior purposive being that anti-theistic criticisms of the teleological argument have usually based themselves on the contention that the appearance of teleology in nature is completely illusory. In other words, I think that Stout would have been on stronger ground if he had attempted a defence of the argument from design in one or other of the two forms I have mentioned above, and that his actual argument falls awkwardly between two stools. Alternatively, he might have regarded this argument as falling under the "deduction of the divine attributes" rather than as one of the theistic proofs; for it is certainly plausible to say that, granted the existence of God, a teleologically ordered world (in Stout's sense) affords us a more important clue to his nature than a non-teleologically ordered one would have done.

5. In his final chapter Stout develops a Moral Argument for the existence of God. He begins by contending that no finite good or object of pursuit can ever give satisfaction in the long run, and that to take any finite end as a complete or absolute end is bound to bring disillusionment sooner or later. We are thus led to form the conception of a complete and ideal good "exempt from temporal vicissitudes and inexhaustible" (p. 307), just as we were led by consideration

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[1] Incidentally, these surely take place in "shot rubbish" just as well as anywhere else.

of the essential incompleteness of the objects of perception to form the conception of a unified universe. The question then arises, is this conception of an ideal good anything more than a figment of the imagination? It would be nothing more, says Stout, if goodness were merely a matter of what satisfies our desires; but, he says, value is objective, it is what *ought* to be desired, whether it is desired or not; value (and I think I had better quote here) "belongs to the constitution of the universe, and not merely to that of the individual who appreciates it or fails to appreciate it, or appreciates it wrongly. Hence the incompleteness of finite values is essential incompleteness. It means that finite good cannot be what it is—cannot be good at all—unless it belongs to the self-complete unity of a universal good." Such a universal good, however, cannot be anything less than "the controlling and all-pervasive scheme of the universe as a whole" (p. 309). Stout pauses to defend this position from the obvious objection that there is too much evil in the world for it to be plausible, and then moves to the final stage of the argument, which is that although the ideal good of which he has been speaking is not itself God, yet unless God existed it would be nonsense to talk of the ideal good in the way he has been doing. Unless, that is, there were some Universal Mind which eternally willed this complete good, no such good could exist, and therefore no genuine finite good could exist either.

The first thing to notice about this argument is Stout's own attitude to it. This is what he says (p. 318): "Like other arguments, and more than the others, it must not be taken apart from religious experience. It is in actual religious experience that the force of it is felt, even though it may not be explicitly formulated". I referred earlier to this view of Stout's about the relation of the formal arguments to religious experience, and I said then that I felt doubtful about his exact meaning. Does he mean, *e.g.,* that the man who has religious experiences is able to see (and even he, perhaps, only *when* he is having such experiences) the validity of certain arguments which others cannot see—that the arguments themselves are valid all the time, I mean, but that those without religious experience find it difficult or impossible to see this validity? This is what some of his statements would suggest, but I do not think this is what is really meant. A more plausible suggestion is, I think, that what he means is that the formal arguments by themselves yield only a probable conclusion, but that by having religious experience we may acquire certain other non-formalisable reasons for believing in God's existence (which *are* reasons, however unformalisable), which taken in conjunction with the formal arguments raise the probability of God's existence to a sufficiently high degree to warrant confident belief. I am not prepared to say categorically that this *is* Stout's view, though it may well be. I think it is a perfectly respectable line for a theist to take (though doubtless an exasperating one to his opponents, who will feel they can't come to grips with his real grounds of belief); but if it is what Stout means, then two things seem to follow: (*a*) we ought to be able to assess the degree of probability which the formal arguments themselves confer on the proposition that God exists, independently of the appeal to religious experience; and (*b*) the formal arguments must themselves yield a substantial probability (I am not sure that one could put a precise minimum figure on it), if they are to play any rational part in the total argument even in conjunction with the testimony of religious experience.

Now Stout's version of the Moral Argument seems to me, I confess, not to possess the requisite degree of plausibility, and that for two main reasons. (*a*) Even if we grant that the unsatisfactoriness of a given finite good leads us to form the idea of a greater good (and I think we *may* grant this), it by no means follows that it leads us to form the idea of an *infinite* good; all that we need form is the idea of something which would satisfy *our* aspirations completely, and that is perfectly compatible with its being finite. (*b*) More important, the question whether the "complete good" is actual or a mere product of the imagination does not seem to me to turn, as Stout thinks it does, on whether value is "objective" or not.

For all I can see, value might be as objective as you please, and yet everything which possessed it might possess it only in a finite degree.

As in the case of the argument from design, however, I think we could find more value in Stout's moral argument if we were to regard it as doing something different from what he wishes it to do. For if we presuppose the existence of God, we shall have to go on to conceive of him as "willing the good" in some total and unified way; and then our (doubtless very partial, but perhaps not negligible) conception of that total good could serve as a means of evaluating the finite goods which we pursue from day to day. In this way we could use what Stout has to say here to help us in giving a rationale of the relevance of God's existence to our moral decisions; but this is of course quite different from offering a moral argument *for* his existence.

6. Lastly—though in *God and Nature* it comes earlier than any of the others I have mentioned—there is an argument which stands somewhat apart from the rest, in that it makes no use of the notion of a Universal Mind. It occurs (somewhat awkwardly, perhaps) at the end of Stout's critique of Hegelianism (pp. 46-52), and is a form of the traditional Cosmological Argument. There is, Stout admits, nothing self-contradictory in the notion of something's beginning to exist; but can there be, he asks, "an *absolute* beginning of existence, a beginning which is unconditioned either by previous events, or by something which is not an event at all"? Here, he says, we have to fall back on metaphysical insight; and when he reflects he finds the answer quite clear: it is "self-evident that a beginning of existence must depend on conditions". But, he asks, would even an infinite series of past events adequately supply such a condition? He accepts Russell's view that such an infinite series is perfectly possible,[2] but contends that even

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[2] Thus evading in advance Russell's well-known (and thoroughly superficial) criticism of St. Thomas on this issue (cf. *History of Western Philosophy*, p. 484)—a criticism which, as Stout's argument here shows quite clearly, misses the whole point of the Cosmological Argument.

an infinite series of events requires explanation as much as a finite one does. "No event can be adequately conditioned even by the totality of previous events, however many these may be . . . . Change and succession finally presuppose an eternal Being without which they are incapable of existing."

I call this "Stout's "cosmological" argument because although all his theistic arguments are of the cosmological type in the wide sense, in that they argue from the world to God (there is no hint of the Ontological Argument anywhere in the book), this one comes nearer than any of the others to the traditional Cosmological Argument. The chief thing I want to say about Stout's handling of it is that he sees very clearly just what the crux of the Cosmological Argument is; and that in two respects: (*a*) He sees that what according to the argument requires explanation is the fact that things *exist*: not that they have this or that property, but that they exist at all. He concentrates attention, it is true, on their "coming into existence" (he regards all events as instances of the coming into being of *something*), and this may not be the only method of pin-pointing the issue; but it is at least one effective method. (*b*) He sees clearly that at the crucial stage the Cosmological Argument depends on some kind of metaphysical insight. There is in fact no possibility of arguing purely deductively from the empirical facts of the world to anything other than the empirical facts of the world. My only ground of complaint here is that Stout has not stated the basis of the argument broadly enough. For if there is anything in the argument at all, the continued existence of anything is as much a mystery to be explained as its *coming into being*. The nerve of the argument seems to me to lie not in the narrower principle that "a beginning of existence must depend on conditions" (which is all that Stout gives us), but in the wider principle that the existence of any contingent, non-self-explanatory being must depend on something other than itself—something actual (not a mere formula or law, *e.g.*), and something which is "other" precisely in respect of that which makes us call the original object "contingent". To point to the *beginning* of the existence of x is only, it seems to me, a dramatic way of calling attention to x's non-self-explanatoriness. It is, I think, with this wider principle that the Cosmological Argument stands or falls; Stout's discussion, however, does have the great merit of showing that some such principle is involved, and that it isn't either a tautology or an inductive generalisation (though these are not the terms he uses). A metaphysical principle like this has nowadays, of course, to face criticisms of a kind with which Stout does not deal; but here again we have to remember that he was writing over thirty years ago.

It seems natural at this point to say something about the notion of "essential incompleteness"—a theme which runs persistently through *God and Nature.* Stout clearly regards this as the very basis of metaphysical construction, but it seems to me that he uses it in two different ways which he does not clearly distinguish. As a general epistemological point, he lays great stress on the fact that when we perceive objects we think of them as in a context which has to be supplied or presupposed before we can understand the objects themselves. It is not difficult to see what he means here, nor is it difficult to see why this train of thought should lead him to the conception of the universe as a whole regarded as a unity. But my point here is that what a given object requires to be supplemented by is a context of objects of the same kind (or at least on the same "ontological level") as itself; and this is *not* the kind of supplementation which is required if the theistic proofs are to be valid, and therefore this is not the kind of essential incompleteness which objects must have if they are to serve as starting-points for an argument for the existence of God. Or rather, *this* kind of essential incompleteness would lead us, if to any theistic conclusions at all, to *pantheistic* ones; and Stout is emphatically not a pantheist. It is true that he lays so much stress on the question of the unity of the universe that one begins to wonder whether he is going to say that this issue *is* the theistic issue; but when it comes to the point he is quite clear that it is not (and he is quite right about that). God is not the unity of the universe, or even the universe regarded as a unity, any more than he is the ideal good; he is the ground of both.[3] All this is orthodox enough theism; but if I am right in thinking that the kind of essential incompleteness which Stout describes and discusses in detail leads at most to the unity of the universe, and that a different kind is required for the theistic argument, this raises the question whether the unity of the universe is necessary, or even relevant, to the theistic issue at all. If the argument from the world to God is valid at all, why should we not proceed straight from one finite object to the existence of God, on the ground that we can see that, however widely-ramified and closely-knit a context we supply for the object on the same ontological level as the object itself, it can in principle never provide the relevant kind of explanation of the existence of the object, and that this is so whether the context forms a "unity" or not? It may be that Stout's reason for wishing to demonstrate the unity of the universe is that he thinks this is necessary in order to demonstrate the unity of God. But if that is so, it is fair to point out that it has often been thought possible to secure this result by other means; it could be argued, *e.g.*, that the contingency of one finite object implied the existence of some necessary being, and that on reflection we can see, without any further appeal to the nature of the world, that there can be at most one necessary being, and that that necessary being must be a unified or "simple" being. I do not know what Stout thought of this kind of argument, and I very much wish he had discussed it; it is, indeed, noteworthy that while he shows himself familiar with the work of the scholastics he makes no reference to that most scholastic of all notions, that of God as a "necessary being".

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[3] Even here I am in some doubt. Sometimes Stout seems to use the word "universe" in such a way that both God and the world of finite things are included in the "universe" (*i.e.* "the universe" = "the whole of being"), but sometimes he distinguishes between God and the universe. This may, however, be no more than a verbal ambiguity which he never cleared up in the MS., and if so it leaves the point I am making here unaffected.

I turn now to make some comments on Stout's views about the nature of God and his relation to the world, as distinct from the theistic arguments. I shall refer especially to three topics on which he has something original or unusual to say.

1. On pp. 51-2[4] he argues that if we grant the existence both of the universe and of God conceived as an eternal and therefore non-temporal being, we can prove that the universe has always existed. For if we suppose that the universe has only existed for a finite time, we are forced to think of a time before the world began, a time when only God existed; but this is to think of the Eternal Being in temporal terms, which is self-contradictory. And the issue here is not merely one about the eternity of the world, for the position for which Stout is basically contending is that "the Eternal Being is incapable of existing except in relation to the time-process", that the temporal and the eternal are each "essentially incomplete", each "incapable of being what it is without the other"; and this is a proposition of capital importance for natural theology. Now I do not claim to know whether the universe has always existed or not, but supposing it has not, the difficulty of avoiding "presupposing a time before the first event" appears to me to be a difficulty of imagination rather than one of thought. Provided we stick rigorously to saying that the first event was the *first* event, and that temporal questions are meaningless except when applied to events *within* the world, so that the phrase "before the first event" is literally nonsense, however much we want to try to imagine it has meaning, we do not, as far as I can see, run any risk of contradicting ourselves. And if so, then whether or not the world has always existed, an Eternal Being might conceivably exist timelessly with no world; and therefore we are not forced to regard such

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[4] I regret that I should have to criticise this passage, since the Editor notes that in Stout's MS. it was enclosed in brackets, presumably for revision; but it is the only passage I have noticed in the book which deals directly with this important topic.

a Being as essentially incomplete, or dependent for its existence on the world.

2. Closely connected with this is Stout's view that while God is the creator of finite minds, it is not necessary to think of him as the creator of matter; and in fact he is obviously strongly inclined to think that God is *not* the creator of matter, but that matter is "primary and underived" (pp. 230-2 and 243). God must, he holds, be all-powerful in relation to matter, but that is not to say that he has *created* it. To the objection that to deny the power of creating matter to God is to limit his omnipotence, he replies that this presupposes that there *is* a power of creating matter, but that if matter is "primary and underived" to talk of such a power is nonsense. My comments on this view would follow the lines I have indicated in the last paragraph. The question here, of course, is not whether matter has always existed or not (though it is sometimes thought that it at least depends on this), but whether matter depends for its existence on God and whether this dependence is a one-way dependence. I have already said that I do not find Stout's argument for a two-way dependence of God and the world on each other convincing; and I think that whatever force there is in the Cosmological Argument points in the direction of a one-way dependence of the world (matter included) on God.

3. In the last chapter of *God and Nature* Stout makes a strenuous effort to tackle the problem of reconciling the existence of God with the presence of evil in the world. This is, of course, a formidable problem which any natural theology has to face, and Stout, to his credit, makes no attempt to solve it by minimising the evil in the world. To avoid misunderstandings of Stout's procedure here, I want to point out that the "problem of evil" may appear in at least three different lights, according to our point of view. In some contexts it may appear as an objection to the whole theistic contention, as an argument against there being a God at all; it will naturally so appear to a person who thinks there are no

positive reasons for believing in God's existence at all. On the other hand (and this is the second possibility) if, independently of our consideration of the fact of evil, we consider we have overwhelming or conclusive reasons for believing in the existence and goodness of God, the existence of evil will appear as something to be reconciled with our previous conclusion rather than as destructive of it—reconciled, because at first sight we should expect that if God existed the world would contain no evil at all. But thirdly, if we were convinced merely of the existence of some kind of God or other, then the presence of evil might lead us (as Philo in Hume's *Dialogues* argues) to make or deny certain statements about his nature; *e.g.* to deny moral attributes to him. In Stout's discussion the problem of evil appears in the second of these three ways; and this, in the structure of his total argument, is clearly right. Only it is necessary to point out that it *is* right, because if we forget that he considers he has already established the existence and goodness of God his arguments here will seem to be evading crucial issues. Stout's general position at this point could be criticised only if it could be shown that the premises on which he relies for his theistic arguments were themselves incompatible with the existence of evil; and this I think could not be shown.

Stout's attempt to reconcile the fact of evil with the existence of God is along the following lines. He first of all points out that it is frequently contended that God wills evil as a necessary means to certain kinds of good. This view he rejects, on the ground that God, unlike ourselves, does not require to adopt *means* to anything. But he argues that evil may be a necessary condition of goodness even at the human level in another way than that of being a means. A doctor fighting a cholera epidemic may display great goodness of character, and the existence of the cholera is one condition of this goodness, but he does not use the disease as a *means* to his own virtue; rather in such a case evil is necessary to the existence of goodness in the sense of being included in it as "something to be hated and abolished" (p. 321). And while God can dispense with the evil *means* which we sometimes find it necessary to adopt in order to bring about what is good, he could not without self-contradiction will the kind of goodness of which evil is a necessary *constituent* without willing that evil.

Now this is a valuable point about the relation of evil to goodness, and one which is not always made in discussions of this question; and I see no reason to doubt that there are instances of the kind of goodness to which Stout refers. Furthermore, he stresses that in willing these evils God must be thought of as hating them "in a degree which to us is incomprehensibly great"—for the hatred of the evil is a necessary element in the kind of goodness in question. Two vital questions, however, seem to me to arise here: firstly, is *all* goodness of this nature (Stout, of course, does not say it is); and secondly, if it is not, if, that is, there are instances of "unmixed" goodness, which do not essentially include any evil at all (and I think there are), is it not possible that a universe in which all the goodness was of this unmixed type might be better on the whole than the universe as we know it? It seems to me far from obvious that it could not be. It might, of course, be argued that God necessarily wills (or that it is most consonant with his nature that he should will) that as many kinds of goodness as possible should have instances, or at least be given the opportunity to have instances, even if this involved that the *total* amount of goodness in the universe will be less than it might have been; but this again seems to me far from obvious. It has in fact often been argued that God does not will evil at all, and that all the evil in the world is the product, direct or indirect, of wills other than God's;[5] I am pretty sure that Stout would have rejected such a view (it certainly has its difficulties), but it would have added to the completeness of his discussion if he had dealt with it.

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[5] This view would be compatible with a good deal of what Stout says. For granted that evil *does* exist, God would presumably will that *we* should develop the kind of goodness which includes evil as something to be hated and abolished, since this is the only—or at least the best—way in which the evil in question can be transcended——though I am not sure that that is the right word.

I have devoted a large part of this review to adverse criticism. I feel sure Stout would not have objected to *that*; yet in the end I wonder whether I haven't let the most important thing about the book slip through my fingers. For Passmore is quite right: *God and Nature* is the completion of Stout's philosophy. It contains his reflections on the questions which he regarded as of the deepest concern for human life; and they are the reflections of a very mature, subtle and philosophical mind grappling with perhaps the hardest of philosophical tasks, that of giving coherent and rational expression to an attitude to life as a whole which has been acquired by living as well as by thinking in the study. His arguments may often have to be pronounced inconclusive by the logical analyst, but they are never capricious, never trivial, never insincere. Even their inconclusiveness when taken in isolation is of less moment than it might have been, for Stout's purpose is not to take the unbeliever by the throat and force him by sheer logic into an intellectual assent to theism; it is rather by a cumulative series of interlocking arguments to confront us with a theistic "philosophy of life" (that is, something much more than a true proposition) as something cleared of inconsistency, reasonable, and in intimate co-ordination with our knowledge of the world and our moral aspirations.

G. E. HUGHES.

REVIEWS

REFLECTIONS OF A PHYSICIST. By P. W. Bridgman. (Philosophical Library, New York, 1950. 392 pp.) Price, $5.00.

These occasional essays, originally published at various dates between 1929 and 1947, are divided into five groups: the first four essays define, defend and develop the operational theory of meaning; then there are six physico-philosophical essays (pp. 81-223), six more which are "primarily social" (pp. 223-314), four political pronouncements (pp. 314-332) and two attempts to predict "the prospect for intelligence" (pp. 342-369).

The operationalism here presented diverges in important respects from the operationalism of Bridgman's *The Logic of Modern Physics*, to say nothing of the operationalism of his more incautious disciples. It is an exaggeration, he now says, to *identify* meaning and operations; operations are necessary, but not sufficient, to determine the meaning of a concept (p. 4)—a modification comparable to the transition, within logical positivism, from the strong to the weak form of the verifiability principle. And he has become conscious of the difficulties there are in defining an "operation". In a broad sense of the word, he now thinks, the assertion that meaningful concepts must lead to "operations" is a mere tautology (p. 5). If operationalism is to be used as a method of distinguishing meaningful from meaningless concepts, certain *kinds* of operation have to be singled out as "acceptable", these being such operations as mathematical calculations and experimental observations, to which contemporary science gives its blessing. Thus what was originally proposed as a stick to beat the metaphysicians with has gradually diminished to a description of present-day scientific habits; the analogy with logical positivism will again be obvious.

But in one important respect Bridgman has remained faithful to the earlier stages of positivism; his subjectivism is frank and unmitigated. "Science", he says, "is essentially private" (p. 44); again, "if I want to express what obviously occurs, I have got to use the first person"; and more eloquently, "I am separated from my fellows by an impassable chasm, a chasm so impassable that even meanings cannot be the same on both sides of it, in spite of my passionate desire" (p. 256). The usual ambiguities sustain this subjectivism. Thus the obvious fact that "*my* pain" is different from "*your* pain" and "*I* think" from "*you* think" is interpreted as if it immediately implied that "being pained" and "thinking" are also "dual in meaning". And Bridgman is intolerably careless of the distinction between "I — Bridgman" and "I — anyone". At one place, indeed, he suddenly remarks that "all I can say is that *I* am inexorably isolated from my fellows", where "I" is presumably "I — Bridgman", but how then is he to sustain his quite *general* theses that "science" is private and that "the human being" is inescapably free "within the walls of his own consciousness"? These conclusions require us to interpret "I" as "I — anyone", even although it ought to follow from Bridgman's arguments that propositions about "I — anyone" are unintelligible.

But, of course, Bridgman has somehow to span the chasm between "private" and "public", or else resign himself to perpetual soliloquy. We are to contemplate, in the first place, the inventiveness of some prehistoric genius. "It was an invention of the very first magnitude when man first learnt to anticipate the actions of his neighbour by saying to himself 'How would I feel in the same situation?'." (How the primitive subjectivist comes to talk of "the same situation" Bridgman does not explain.) The next stage is for other human beings to imitate this pioneer. "The invention having flowered, it proved most congenial to the genius of the race; it was no trick at all for one to imitate the other as he saw him use this invention" (p. 70). So men came to think that other men think by noticing someone-else thinking that other human beings think! Far from being "no trick at all", this must lay claim to being "the neatest trick of the week". And then from "this is how *I* would feel" the next move is to "this is how *he* feels", even although the primitive language, according to Bridgman, contains no word for "feeling", as distinct from "my — feeling". "This piece of imagining is done so easily that I forget what I am doing and presently find myself using a single word 'sensation' covering both 'my' and 'your' and still a little later materializing my dualistic linguistic creation by attaching meaning to 'sensation' as such, unqualified by 'my' and 'your' " (p. 65). None of this conjectural history, of course, is supported by the slightest reference to the way in which we actually, here and now, learn the meanings of words like "think", "feel", "sensation", nor by any enquiry into the historical development of these words in our language; Bridgman writes, for example, as if it were a deliverance of experience rather than a piece of epistemological theorising that we encounter "sensations": he does not even notice the sufficiently obvious fact that there is no non-technical synonym for the word "sensation" in phrases like "a sensation of red".

If Bridgman's subjectivism were merely a piece of fancy theorising by a philosophically-innocent scientist it might be passed over without comment. But Bridgman is an unusually critical and self-conscious scientist; this volume, for all its peculiarities, leaves one in no doubt about his abilities; in asserting that operationalism describes current scientific practice, he does not seem merely to be erecting his whims into a general method. These essays, in fact, reinforce one's suspicion that physics stands badly in need of philosophical clarification, however little competent one may be to undertake that clarification oneself; they serve as a warning, partly through their own defects, partly through their often very forceful criticisms of contemporary work, that for philosophers to take physical theory as something "settled" which they have then to incorporate into their philosophies is to ascribe to physics a degree of independence from philosophy which it certainly does not possess.

Indeed, Bridgman insists upon the operationalist interpretation of physics in an effort to check the unbridled metaphysics of mathematical physicists and cosmologists; some of the most interesting of the second group of essays, especially *On the Nature and the Limitations of Cosmical Inquiries*, turn around this very point. He suggests, for example, that the uncritical attitude of many cosmologists towards Einstein's equations of the general theory of relativity, even in the face of the difficulties to which they give rise, derives from a metaphysical presumption: that equations are "the only things we are really sure of", the one method of discovering what the world is *really* like. Bridgman goes so far, indeed, as to argue that the present emphasis upon elaborated formal mathematics is "merely a temporary phase" (p. 119) as opposed to the view that mathematics is, and must remain, the heart of physics.

For the rest, the essays in the second group are largely concerned with causality, which is discussed in the manner now quite familiar to us. It is presumed that if "the present cannot be completely described" this implies that "the law of cause and effect must be given up" (pp. 93-94). Of course, this is not an entirely arbitrary presumption: historically, the doctrine of complete describability has been very closely linked with determinism; and, even now, defenders of determinism often argue in Einstein's manner that "the programmatic aim of all physics" is "the complete description of any individual (real) situation". But it is certainly time that causality and prediction were disentangled one from the other: the question whether every change has a cause is quite distinct from the question whether complete foreknowledge is possible in principle.

The essays on social and political questions are mainly concerned to defend the freedom of science against ideals of "social planning" and "social responsibility". As one might expect, there are innumerable ragged edges in Bridgman's social theory. But he develops in an interesting way the thesis that science works with an ethic of intellectual honesty within a society which has never been accustomed to place any high value on disinterested inquiry: and that accusations of "social irresponsibility" directed against the scientist arise largely out of the clash between this and the conventional moral outlook (see especially the eleventh essay, *The Struggle for Intellectual Integrity*). And with more modesty than scientists always display, he insists that scientists are not particularly competent either to estimate the social consequences of their discoveries or to fight for their application in any specific way (see the fourteenth essay, *Scientists and Social Responsibility*). For the rest, his political views are in part a criticism of "sentimental democracy"—understood as the view that one way of life is quite as valuable as another—and in part a somewhat optimistic estimate of the extent to which intelligence can overcome social conflicts.

JOHN PASSMORE.

A HISTORY OF GREEK POLITICAL THOUGHT. By T. A. Sinclair. (Routledge and Kegan Paul, 1952.) Price (U.K.), 25s.

This book has been written by a classical scholar for his fellow-scholars and for the more intelligent general reader; and a philosopher reviewing it for a philosophical journal is almost certain to misrepresent it. For those who know their classical literature but not their political theory, or even for general readers who want to learn about both simultaneously, it will no doubt be adequate and satisfying; for it is well written, animated by a humane and liberal spirit, and its *précis* of the principal authors is concise, reflective, and highly intelligent. For philosophers it is not quite so interesting, because (like fourth century astronomy as seen by Plato) it does not "rise to problems". And not only does it not rise to philosophical problems; it does not even rise to historical problems about philosophy. It is just not problem-minded at all.

For all that, as so often happens with good scholars, Professor Sinclair's work gives rise to problems which he himself does not pursue. . He provides much information about minor or non-philosophical writers which help us to replace the giants in their proper context. He has thoroughly ransacked the Continental post-war literature on Greek political thought, and the following up of his references (where physically possible) will be most helpful to Australian thinkers who are inevitably cut off from these sources at first hand. And he certainly covers the ground. From Homer down to Philo of Alexandria, there is no relevant writer of importance who does not receive mention. This, perhaps, is not wholly a virtue. It is partly because he is so concerned to present a complete picture that he fails to elaborate at the crucial points.

For the reader who approaches the work with a knowledge of Plato and Aristotle, the sections on these authors are the least attractive. They paraphrase, clearly and elegantly, what he knows already, with only a minimum of reflective comment or comparison. This is a pity, because, of the rare comments, some (e.g. on Plato's lack of concern for the rights of women, p. 156, and on the general Greek indifference to the idea of toleration, p. 180) are highly instructive; and of the few comparisons, several (including the quotation from *Pravda*, p. 167, which exactly follows Plato's extremer pronouncements on art, and the confrontation of Aristotle with Jefferson, p. 211) are remarkably apt. The philosopher who is looking for a new slant on Plato and Aristotle will skim the intervening *précis* in the hope of lighting on these occasional observations. He should, however, bear it in mind that if Confucius and Mencius were in question he would be only too grateful for a compendious account of their works and views, and that Professor Sinclair's book is not primarily intended for the edification of specialists.

By far the most interesting section for philosophers is that which deals with the diffusion of political concepts in the fifth century B.C., and in particular with the conflict of *Nomos*-theory and *Physis*-theory. *Nomos*, as is pointed out, starts by being equivalent to custom (cf. Demaratus in Herodotus, *ἔπεστι γὰρ δεσπότης* ΝόΜΟΣ), but, at a time when new *nomoi* were being created with every colony, comes to mean "constitution" or even "charter" (p. 41); a set of rules laid down, it is true, for all time, like the *nomoi* of tradition, but established by a *nomothetes* or law-giver, and substantially differing from city to city. Hence the double conviction expressed in Herodotus and defended by Protagoras, that *nomos* was both man-made and deserving of obedience. If it had been possible for the fifth century democrats to clarify their working convictions, they would have done well to accept the *Nomos*-theory, to defend the constitution as an agreed basis for their disputations, and to keep *Physis* out of the picture: it lends itself so easily to dogmatists who find in an appeal to "nature" an excuse for pushing other people about. There were contemporary factors which prevented the democrats from thus becoming conscious of themselves: in particular, unless moral and political problems can be separated far more clearly than the traditions of the *Polis* allowed, the explanation of *Nomos* as convention will inevitably appear (as the whole genius of Plato was devoted to making it appear) as an attack on morality.

Nevertheless, through the lectures and writings of Protagoras, this modern solution was far nearer to acceptance than the text-books suggest. As between Protagoras and the materialists (e.g. Archelaus and Antiphon) who first propounded the *Physis*-theory, the balance was even and the issue open. But the *Physis*-theory had a philosophical drive behind it which the *Nomos*-theory lacked; it answered to the sense that there are fundamental things about human nature which do not stop at the city's boundaries. The *Nomos*-theory of the State required as its complement a *Physis*-theory of morals; and in default, it was fatally exposed to the *Physis*-theory even in its cruder forms, and was doubly exposed to it in the moralized and sophisticated form given to it by Plato. Yet it was the *Nomos*-theory which offered the best basis for defending the achievements of Greek democracy. When, in its cruder and more violent later days, democracy espoused *Physis* understood as mere self-interest, it set up an authoritarian anti-moralism to which Plato's authoritarian moralism was the obvious retort.

How many of these reflections are actually to be found in Professor Sinclair's book it is hard to say: in general, the observations on *Physis* and *Nomos* are his, and their application to Greek democracy is the reviewer's. But all of them owe their stimulus to him, and it will be found that Chapter IV and the first part of V, from which they arise, are far the most stimulating in the whole book.

The other feature of Professor Sinclair's treatment which is of special interest to the historian of political thought, and incidentally to the political philosopher, is his interpretation of the Hellenistic period. The conventional view is that at this stage Greek politics became autocratic and Greek ethics purely private. It is a merit in Professor Sinclair's narrative that it shows the continuity between Hellenistic practice and the writings of the philosophers, and especially of Plato. It is particularly interesting to note that the Platonic proposal which strikes the modern mind as peculiarly Utopian, viz., the proposal for the philosopher-king, was precisely that which, in the Hellenistic period, seemed to be nearest to practical politics. Government was in the hands of one man anyhow: the best that could be done was to urge that he behave responsibly. Alexander himself preferred Homer to the philosophers; he sprang, in fact, from a belated Homeric society. But his successors, accorded divine honours as Saviours, Benefactors, and Lovers of Mankind, when they had established themselves and could afford a conscience, looked to the philosophers for handbooks on kingly behaviour; and the philosophers did at least something to graft on the new absolutism some of the values of the city state. Needless to say, they did not insist, like Plato, on geometry; but they did commend justice and even-handed dealing and even equality. As Professor Sinclair says, "Hellenistic monarchy never resigned its claim to embody the principle of equality, that is, proportionate equality, being fair (ἴσος) to everybody" (p. 302). It was only natural that the writers of the time should stress the superior elasticity of justice when concentrated in one pair of hands. Plato, after all, made the same point in the *Politicus*, and Aristotle in the *Rhetoric* tells us of one Alcidamas, who is said to have referred to philosophy as "a bulwark against the laws" (p. 78). The personalizing of the political virtues in the Hellenistic age had its advocates in the classical period, and the classical models had some effect in keeping the more thoughtful of the Hellenistic autocrats in the path of virtue.

Enough has been said to show that, even for philosophers, the work is by no means without interest. Whether thoroughly competent narrative supported by judicious *précis* is worth a book depends on what one thinks books are for. The original contributions to learning contained in this book could have been compressed into a couple of articles. On the other hand, for a broad illuminating introduction it is far too detailed. There is thus a danger that it may fall between two stools. But if there is still a demand for scholarly, accurate, sensible and humane predigestion of texts and documents, here is something to satisfy it. It has the further advantage that it is attractively written and presented.

A. BOYCE GIBSON.

BOOKS RECEIVED

(Mention in this list neither precludes nor guarantees later review.)

MODERN NATIONALITIES—A SOCIOLOGICAL STUDY. By Florian Znaniecki. (University of Illinois Press, 1952. xvi + 196 pp.) Price, $3.95.

IN PRAISE OF LIFE. Poems by H. N. Spalding. (Blackwell, 1952. x + 292 pp.) Price (U.K.), 21s.

SOCIAL PSYCHOLOGY. By Theodore M. Newcomb. (Tavistock Publications, 1952. xi + 690 pp.) Price (U.K.), 30s.

PSYCHOANALYTIC STUDIES OF THE PERSONALITY. By W. Ronald D. Fairbairn. (Tavistock Publications, 1952. xi + 312 pp.) Price (U.K.), 25s.

SRI AUROBINDO AND THE SOUL QUEST OF MAN. By Nathaniel Pearson. (Allen and Unwin, 1952. 127 pp.) Price (U.K.), 10s. 6d.

THE NAMIC PHILOSOPHY. By John Embry. (Philosophical Library, 1951. 238 pp.) Price, $3.75.

HENRI, COMTE DE SAINT-SIMON: SELECTED WRITINGS. Edited and translated with an Introduction by F. M. H. Markham. (Blackwell, 1952. li + 116 pp.) Price (U.K.), 12s. 6d.

MIND AND LIFE. By Sir Arthur Tansley. (Allen and Unwin, 1952. ix + 171 pp.) Price (U.K.), 15s.

An Analysis of Resemblance. By R. W. Church. (Allen and Unwin, 1952. 136 pp.) Price (U.K.), 12s. 6d.

The Feast of Unreason. By Hector Hawton. (C. A. Watts, 1952. 236 pp.) Price (U.K.), 15s.

The Child's Conception of Number. By Jean Piaget. (Routledge, 1952. ix + 248 pp.) Price (U.K.), 25s.

God and the World. By Thomas Miller Forsyth. (Allen and Unwin, 1952. 160 pp.) Price (U.K.), 10s. 6d.

Vedanta for Modern Man. By Christopher Isherwood and others. (Allen and Unwin, 1952. xiv + 407 pp.) Price (U.K.), 25s.

Hume's Intentions. By J. A. Passmore. (Cambridge University Press, 1952. ix + 164 pp.) Price (U.K.), 18s.

Studies in Philosophy. By R. F. A. Hoernlé. Edited with a Memoir by Daniel S. Robinson. (Allen and Unwin, 1952. xvii + 333 pp.) Price (U.K.), 30s.

Near the Brink. By L. P. Jacks. (Allen and Unwin, 1952. 120 pp.) Price (U.K.), 12s. 6d.

Essential Christianity. By William E. Wilson. (Allen and Unwin, 1952. 147 pp.) Price (U.K.), 12s. 6d.

Principles of Intensive Psycho-therapy. By Frieda Fromm-Reichmann. (Allen and Unwin, 1953. xviii + 246 pp.) Price (U.K.), 18s.

The Relationship between Psychology and Science. By William Taylor. (Allen and Unwin, 1952. 244 pp.) Price (U.K.), 12s. 6d.

The Vienna Circle—The Origins of Neo-Positivism. By Victor Kraft. (Philosophical Library, 1953. xii + 209 pp.) Price, $3.75.

Voltaire—Man of Justice. By Adolph Meyer. (Quality Press, London, 1952. 250 pp.) Price (U.K.), 15s.

Christian Faith and the Scientific Attitude. By W. A. Whitehouse. (Oliver and Boyd, Edinburgh, 1952. 147 pp.) Price (U.K.), 12s. 6d.

Reflections on Life and Religion. By Sir James Baillie. Edited by Sir Walter Moberly and Professor O. de Selincourt. (Allen and Unwin, 1952. 288 pp.) Price (U.K.), 16s.

The Faith that Heals. By W. L. Carrington. (Methodist Book Depot, Melbourne, 1951. 126 pp.) Price, 9s. 6d.

A History of Indian Philosophy. Volume II. By Jadunath Sinha. (Central Book Agency, Calcutta, 1952. xv + 762 pp.) Price, Rs 25; 40s.; $6.00.

Your Child Makes Sense. By Edith Buxbaum. With a Contribution by Florence L. Swanson and Foreword by Anna Freud. (Allen and Unwin, 1951. xv + 204 pp.) Price (U.K.), 12s. 6d.

The Hebrew Impact on Western Civilisation. Edited by Dagobert D. Runes. (Philosophical Library, 1951. xiv + 922 pp.) Price, $10.00.

AN ESSAY ON METHOD. By C. Hillis Kaiser. (Rutgers University Press, 1952. vi + 163 pp.) Price, $3.25.

PHANTASY IN CHILDHOOD. By Aubrey Davidson and Judith Fay. (Routledge, 1952. viii + 188 pp.) Price (U.K.), 18s.

ESSAYS ON THE SOCIOLOGY OF KNOWLEDGE. By Karl Mannheim. Edited by Paul Kecskemeti. (Routledge, 1952. viii + 327 pp.) Price (U.K.), 25s.

THE SENSORY ORDER. An Inquiry into the Foundations of Theoretical Psychology. By F. A. Hayek. (Routledge, 1952. 209 pp.) Price (U.K.), 18s.

THE TEMPER OF THE SEVENTEENTH CENTURY GERMAN LITERATURE. By Leonard Foster. (H. K. Lewis, for University College, London, 1952. 36 pp.) Price (U.K.), 5s.

RADHAKRISHNAN. Comparative Studies in Philosophy Presented in Honour of his Sixtieth Birthday. (Allen and Unwin, 1951. 408 pp.) Price (U.K.), 25s.

THE CONCEPTUAL FRAMEWORK OF PSYCHOLOGY. By Egon Brunswik. (iv + 102 pp.)

FUNDAMENTALS OF CONCEPT FORMATION IN EMPIRICAL SCIENCE. By Carl G. Hempel. (iv + 93 pp.)

These two books are parts of the International Encyclopaedia of Unified Science, of which Volumes I and II are entitled "Foundations of the Unity of Science". They are published by the University of Chicago Press, 1952, at a price of $2.00 each.

STUDIES IN THE PHILOSOPHY OF CHARLES SANDERS PIERCE. By Philip P. Wiener and Frederic H. Young. (Harvard University Press, 1952. 396 pp.) Price, $5.00; (Aust.) 63s.

THEORY OF BEAUTY. AN INTRODUCTION TO AESTHETICS. By Harold Osborn. (Routledge, 1952. 220 pp.) Price (U.K.), 21s.

JOHN LOCKE: THEORETISCHE PHILOSOPHIE. By Alfred Klemmt (Westkulturverlag Anton Hain, Meisenheim/Glan, 1952. 352 pp.) Price, DM 24.

MEINONG-GEDENKSCHRIFT. By J. N. Findlay and others. ("Styria" Steirische Verlagsanstalt, Graz, 1952. 171 pp.)

LEIBNIZ: ZU SEINEM 300 GEBURTSTAG. By Rudolph Zocher and others. (Walter de Gruyter, Berlin, 1952. 34 pp.) Price, DM 4,80.

THE RETURN TO REASON. Edited by John Wild. (Henry Regnery, Chicago, 1953. x + 373 pp.) Price, $7.50.

Essays by various authors, maintaining that there is a core of truth in the realistic position, defending this view in modern language and applying it to modern problems.